Effective countermeasures against conventional war and terrorist threats. Protection against collateral civilian damage and contamination in conventional, chemical and nuclear attack, with nuclear deterrence against conventional warfare which, as science and history prove beyond doubt, costs more lives than nuclear deterrence. The media who profit from censoring out both effective civil defense knowledge and the effective, safe, escalation-deterred nuclear deterrence of conventional warfare (as the W79 did in Europe in the 1980s), deliberately promulgate terror for cash, catering to politically-correct hate-based pseudo-science bigoted fashions.

Friday, April 24, 2015

Dr Harold L. Brode's new book, Nuclear Weapons in the Cold War

'Why is it that many of those who mourn for the victims of Hiroshima and Nagasaki seldom exhibit the same compassion for victims of the fire raids on the other 63 Japanese cities and the many others who suffered from massive bombing in Europe and elsewhere during World War II? The same level of grieving does not seem to be extended to those many citizens destroyed by the vast number of conventional high explosive and incendiary bombs. Why is it an often-ignored fact that, in both Germany and Japan, vastly more people were killed or injured by non-nuclear means? ... What of the more than 100,000 ... lost in that firebombing raid on Tokyo, that took place five months before the atomic bombings? What about the horrible losses of life in Hamburg, Deseden, Kassel, or Darmstadt in Germany, or in Coventry or London in England, all due to conventional, not nuclear, bombing? ... The Holocaust carried out by Hitler's Germany did not use nuclear weapons to kill millions. Nor did Stalin's Soviet Union use atomic bombs to destroy another 20 million lives. And even today, millions continue to suffer at the hands of other despots, none of whom need to, or have chosen to, resort to nuclear weaponry.. ... Rather, should we not focus on ways to avoid the misery, greed and perceived needs that propel nations (or radical groups, or even individuals) to commit acts of violence or to wage war - regardless of the particular tools they use for destruction?'

– Dr Harold Brode, *Nuclear Weapons in the Cold War,* pages 346-347.

'During the critical period 8-15 February [1968], the U.S. command realized [conventional] bombing was not sufficiently effective. ... The air campaign dropped over 110,000 tons of bombs and napalm on the area around Khe Sanh during the 77-day siege ... the most heavily bombed target in the history of conventional warfare.'

– report DSWA-TR-97-25 quoted by Dr Harold Brode, *Nuclear Weapons in the Cold War,* page 287.

Despite the most extensive use of napalm, Agent Orange and high explosives in the history of warfare in Vietnam, America lost. Conventional weapons proved insufficient for a clean victory against crazy fanatics.

'After World War II ended, the western allies rapidly demobilized and disbanded their wartime forces [unlike the USSR].' – Dr Harold Brode on the reason behind the American nuclear deterrent, *Nuclear Weapons in the Cold War,* page 263.

'General Westmoreland [head of the U.S. Army in Vietnam and former commander of West Point military Academy] had earlier [before 1968] recommended that tactical nuclear weapons be deployed to South Vietnam in preparation for the defense of Khe Sanh [a U.S. Marine base in the demilitarized zone between north and south Vietnam, which in January 1968 came under seige from the communist Vietcong, a siege lasting 77 days and resulting the use of **over 60 kilotons of napalm and over 50 kilotons of conventional explosives**]. ... by 9 February 1968, the situation had become so critical that the use of nuclear weapons to save Khe Sanh was being seriously considered. However, a decision was eventually made by the administration that no nuclear weapons were to be deployed. ... President Johnson's advisors, including McNamara, told him that we could not win the war in Vietnam, and that invading North Vietnam, or using nuclear weapons, ran the risk of drawing the Chinese - and perhaps even the Soviets - into more active participation. ... In the end, Khe Sanh was successfully defended without nuclear weapons, and the North Vietnamese Army withdrew. ... Such careful tit-for-tat tactics resulted most often in plans for only minimal responses, and led to the repeated objection of possible employment of nuclear weapons. ... Public support for use of nuclear weapons seems to be restricted to responses to any nuclear attack on the U.S.'

– Dr Harold Brode, *Nuclear Weapons in the Cold War,* pages 287-8.

The tragedy here is that conventional weapons were more expensive and less demoralizing and thus ultimately failed in Vietnam, leaving the country devastated with tremendous effects on American deterrence. Some indication of the relative importance given to tactical nuclear weapons for deterrence of invasions by military aggressors, rather than strategic nuclear weapons to threaten innocent civilian cities, is given by the average yields of nations in Brode's Table 11-1: Pakistan's nuclear weapons have an average yield of only 68 kt, Russia's are 106 kt, America's are 131 kt, France's are 134 kt, Israel's are 141 kt, Britain's are 234 kt, India's are a substantial 448 kt, and China's are a whopping 1.365 megatons. At least for American and British nuclear weapons, the higher average yields are misleading; individual weapons have flexible yields since the insertion of boost gas into the weapon core can be omitted from the arming sequence to prevent ignition of the secondary stage and thus to lower the yield of a strategic weapon to a small tactical weapon. (In some weapons, the precise time delay between the detonation of the explosive implosion system and the firing of the neutron initiator is variable, altering the fission primary stage yield to give even more control.)

According to Brode's Table 15-3, the number of tactical nuclear weapons (nuclear cannon shells, Davy Crockett Army bazookas, depth charges, torpedoes, and ADMs) in America's stockpile peaked at 22,723 in 1964, when America had 8,028 strategic weapons (warheads in ICBMs, SLBMs, and bomber aircraft). The total number of American tactical and strategic nuclear bombs and warheads is shown to peak in 1966 at 31,700 (11,232 strategic warheads and bombs, and 20,468 tactical weapons). Finally, the peak number of American strategic nuclear weapons peaked in 1975, at 15,748, when America also had 11,305 tactical nuclear weapons, a total of 27,052 American nuclear weapons. The number of American SLBMs peaked at 6,720 in 1978, while the number of American ICBM warheads finally peaked at 2,593 in 1988.

Dr Harold L. Brode, *Nuclear Weapons in the Cold War,* Montgomery Publishing, 2014, 544 pages

After the unpleasantness of the previous post about the EU policy to allow war refugees no protection or adequate search and rescue so that thousands drown, here's some good news, our review of Dr Harold L. Brode, *Nuclear Weapons in the Cold War,* Montgomery Publishing, 2014, 544 pages:

> "In the 1950s, at the RAND Corporation, Leon Goure, a political scientist who was born in Russia and was particularly familiar with the USSR, proposed an idea his professional peers considered ridiculous. He pointed out that the Soviet Union was actually a union of many disparate peoples and made up of numerous distinct ethnic groups. In his mind, it was conceivable that this union would quickly fail if the iron fist of Stalin was ever relaxed."
>
> **– Dr Harold L. Brode, *Nuclear Weapons in Cold War,* page 16.**

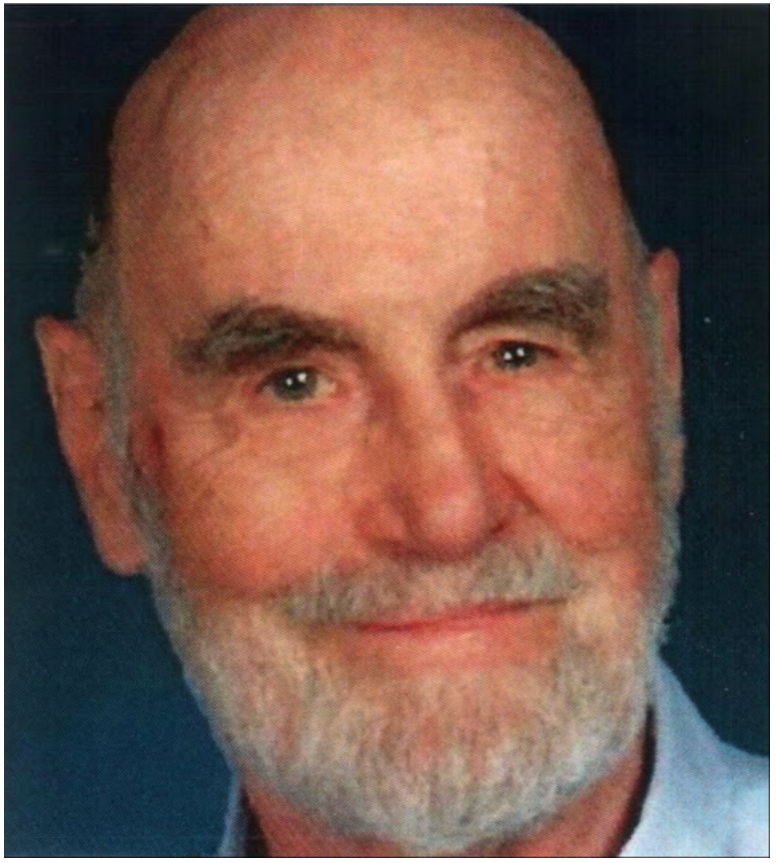
As **editor of the 1992 *Capabilities of Nuclear Weapons***, Dr Brode uses and cites many of his and his associates generally unavailable technical reports, for example *Nuclear weapons effects relevant to surface ships* (by H. L. Brode, Richard D. Small and L. Schlessinger, Pacific-Sierra Research Corporation, PSR Note 477, DNA-TR-81-237), *Nuclear Radiation Influences on Military Effectiveness,* PSR Report 1317, June 1982 AD-B089109, Brode's RAND Corporation report RM-1831 on Sam Cohen's early neutron bomb high altitude burst concept, and repeatedly quotes from *Nuclear Weapons that went to War* (W. C. Yengst, S. J. Lukasik, and M. A. Jensen, SAID report DSWA-TR-97-25, September 1998).

"At Los Alamos during World War II, there was no moral issue with respect to working on the atomic bomb. Everyone was agreed on the necessity of stopping Hitler and the Japanese from destroying the free world. It was not an academic question; our friends and relatives were being killed and we, ourselves, were desperately afraid."

- Joseph Otto Hirshfelder (editor with Glasstone of the 1950 *Effects of Atomic Weapons*), quoted by Brode, *Nuclear Weapons in Cold War,* page 348

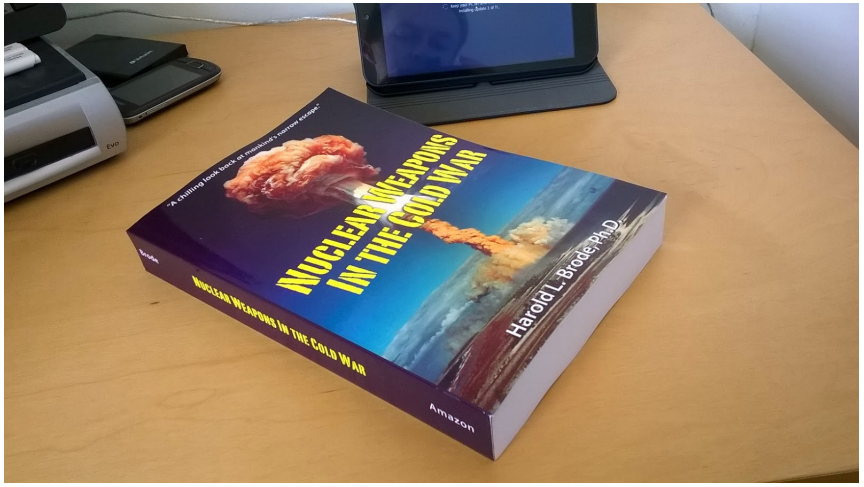
The key problem for the anti-nuclear or disarmament agenda lobby is that, as Dr Brode explains on page 263: "After World War II ended, the Western allies rapidly demobilized and disbanded their wartime forces. As a consequence, the Soviet's conventional forces soon vastly outnumbered and outgunned those of the U.S. and its European allies." Truman tried to deter Soviet expansion across Europe by the threat of nuclear weapons, but it partly failed until the standoff of the Berlin Airlift, because spies had told Stalin that America did not have the means at that time to build up an immense stockpile of nuclear weapons. Then Russia tested a nuclear weapon in 1949 and Truman authorized hydrogen bomb research in response.

The point is that nuclear weapons stockpiles are tailored to suit objectives which would simply need a larger stockpile of conventional weapons. *The idea that a nuclear weapon is immensely more destructive than conventional weapons is debunked by the fact that, if our nuclear stockpile were more than adequate, we could easily cut the yields and numbers of weapons.* Suppose that a single 1 kiloton bomb hidden aboard a Trident submarine was all we need. *Well, why do we have anything more?* The controversy of disarmament stems *entirely from ignorance of the effects of nuclear weapons, and thus their deterrent capabilities*. The smaller the stockpile we have, *the greater the risk of an enemy being undeterred by it*. Dr Brode begins by discussing the paradox that ever since Hiroshima, a vast number of apparent geniuses predicted that the Cold War would certainly end with a bang and not a whimper, at least unless we disarmed or at least accommodate the expansionist needs of Joe Stalin! Violet Bonham-Carter, daughter of the Liberal British Prime Minister who declared war against Germany in 1914, in a speech on 20 October 1938 attacked a populist war terror-mongering appeasement dogma as being "peace at any price."



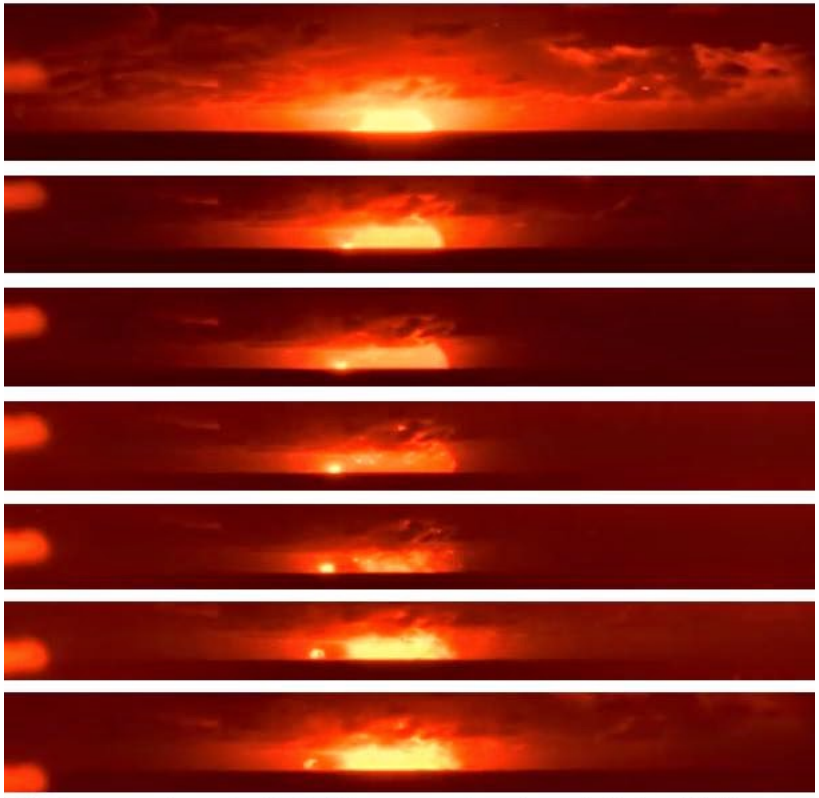
Harold L. Brode, author of Nuclear Weapons in the Cold War and editor of the classified **1992 edition of effects manual EM1, "Capabilities of Nuclear Weapons"**

Hal Brode, RAND Corporation's legendary nuclear effects expert and editor of the **1992 edition of effects manual EM1, "Capabilities of Nuclear Weapons"**, has cut no corners and omitted no gripping controversy in the entire field of nuclear weapons and cold warfare. Topics covered, in entertaining style and great depth of research, span from nuclear bomb effects during tests and combat use in Japan, to the failure of deterrence in the different wars since 1945, and from nuclear accidents and beneficial effects of low dose rate radiation. He discloses new facts about secret research at RAND Corporation by people like neutron bomb inventor Sam Cohen.



The illustration of the French nuclear test Licorne on the front cover is appropriate, since Dr Brode deals with nuclear weapons and accidents by all countries, not just the USA. The book includes 19 pages of references, including this blog, which is quoted on pages 242-5. In a nutshell, Brode has produced a more logical, better organized, better researched textbook on nuclear weapons and cold war history than the populist, "politically correct" books by Richard Rhodes and renowned academic historians. There are some interesting technical points, for example it is well known that the **15 megaton Bravo nuclear test was connected to an island 1.4 miles away by 12 vacuum tubes**, and that these tubes carried about 1 kt of explosive energy from the explosion, as discovered from the filmed sequence below by the neutron time of arrival experiment officer, Sterling Colgate, in his discussion (*Los Alamos Science* issue 28, 2003, page 39):

15 megaton Bravo: nuclear lightning bolt to right of fireball



1 kt of energy channeled in the 12 vacuum pipes towards Station 1200 from the Bravo bomb casing, creating the secondary fireball visible moving leftwards from ground zero in this film. S tirling Colgate explains in Los Alamos Science magazine in 2003 (issue 28, 2003, Figure 1 on page 39) explains: "Less obvious was a late worry that a 'fireball' of energy might travel along the pipe lines [just as X-ray energy flows like a fluid from the primary to the secondary stage within a thermonuclear weapon]. ... Later pictures showed a fireball of 1 kt equivalent energy travelling along the pipe lines ..."

Brode explains in *Nuclear Weapons in the Cold War* that the secondary 1 kt explosion of the 12 vacuum pipes combined with the strong updraft from main 15 megaton explosion to throw out the concrete foundations of the pipelines with such force that they produced secondary craters when they fell back. (**The 15 megaton explosion about 2.25 km from Station 1200 caused a peak overpressure of 130 psi**; by the cube-root scaling law 15 megatons produces the same pressure at 25 times the distance for 1 kt, so you get a similar 130 psi peak overpressure at 90 m from 1 kiloton and at 2.25 km from 15 megatons.)

Dr Brode explains on pages 27-8 that his first involvement with the arms industry was as a sheet metal machinist with North American Aviation at Mines Field in Los Angeles in 1941, assembling the B-25 bombers used in the very first American air strike on Tokyo, Japan, April 18, 1942. Brode explains on page 30 that 250,000 Chinese civilians were "assassinated" by Japan in retaliation for that air raid. He remembers the announcement that Japan bombed Pearl Harbor, December 7, 1941 (page 28):

> "I was listening to the Sunday morning radio broadcast of the Mormon Tabernacle Choir in my parent's living room when the broadcast was interrupted with the news of that attack. At the time, I had been working nights, building bombers and fighters at North American Aviation and was attending junior college during the day. The next day, Monday, the United States declared war on Japan. Then four days later, Germany declared war on the United States."

Brode spent the year 1943-4 at the University of Minnesota cramming two years of maths and physics into one, before serving in the US Army Air Corps as a 2nd Lieutenant. On page 44 he lists the 52 million casualties of World War II by country, dividing the mortality into civilian and military deaths. Poland, the country whose invasion triggered off Britain's declaration of war on Germany, lost 17.2% of its population, many in concentration camps, with only 2% of the fatalities being military deaths. The USSR lost 20.6 million, 10.4% of its population, half of which were civilians. Germany lost 6.85 million or 9.5% of its population, with again about half of the deaths civilian. By using nuclear weapons, America kept its casualties to half a million, 0.4% of the population, all military personnel.

He quotes Nagasaki nuclear bomber pilot Major General Charles W. Sweeny's testimony (page 45):

> "Today, millions of people in America and Japan are alive because we ended the war when we did. This is not to celebrate the use of atomic weapons. Quite the contrary. It is my fervent hope that my mission is the last such mission ever flown. But that does not mean that back in 1945, given the events of war and the recalcitrance of the enemy, President Truman was not obliged to use all the weapons at his disposal to end the war."

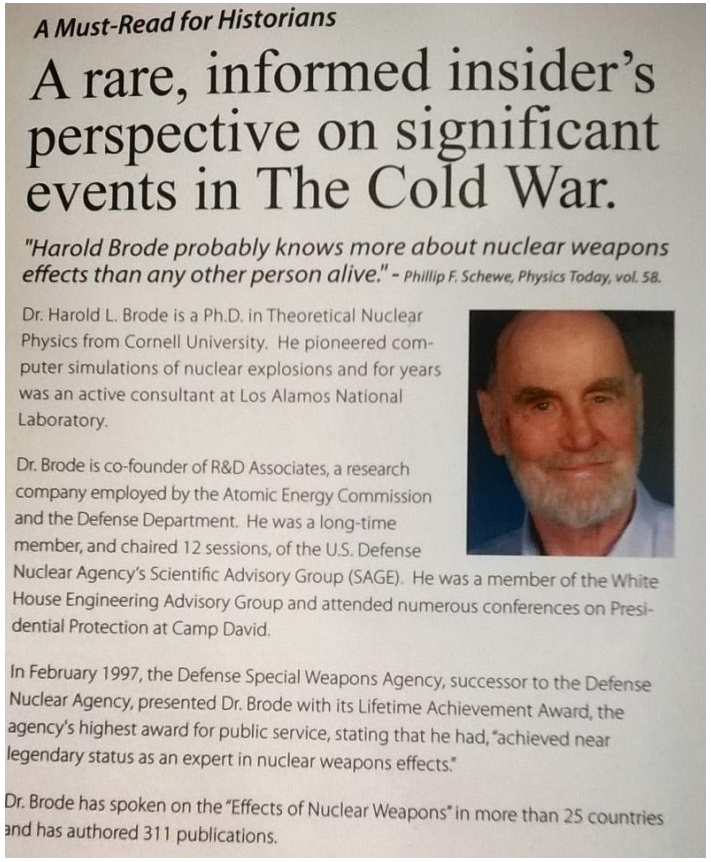
Harold Brode thanks Hiroshima and Nagasaki and resulting *rapid* surrender (the offensive war was by then over for Japan regardless of the nuclear air bursts, but a massive defensive war in the home islands of Japan was still on the cards for Prime Minister Hideki Tojo) for maybe sparing his life as a 22-year-old scheduled for the second D-Day of World War II, planned for 1 November 1945 (pages 84-5):

> "Invasion of the Japanese home islands … had been estimated to lead to the probable deaths of between 400,000 and one million U.S. soldiers and sailors. In addition, as many as half a million British troops would have been at risk … 800,000 Japanese defenders and civilians were expected to be casualties. I personally have always been grateful that the war in the Pacific was brought to a conclusion when it was. At the time that the first atom bomb was dropped on Hiroshima, I was … a 22-year-old second lieutenant in the Army Air Forces … in charge of a small detachment of 18-year-old draftees who were destined (but ill-prepared and totally inexperienced) to join the invasion … We were scheduled to land on D-day-plus-one and immediately scatter into the interior of that likely hostile country ... Those two nuclear weapons destroyed many lives in Hiroshima and Nagasaki – but, by ending the war, they saved a great many others … possibly including my own."

Prime Minister Hideki Tojo who planned the Japanese surprise attack on Pearl Harbor in 1941 that started the war was, as Brode explains at page 340, fiercely opposed to surrender even *after* two nuclear weapons had burned down many of the wooden houses of Hiroshima and Nagasaki, and killed about a quarter of their populations.

As Glasstone and Dolan tabulate, however, for people exposed without any protection in Hiroshima the 50% lethal radius was about 1.3 miles, compared to just 0.12 mile for people protected by modern style concrete buildings. Therefore, modern city buildings reduced the area for 50% killed by a factor of almost 120, so the Hiroshima firestorm, which took 2-3 hours to reach its peak intensity according to Glasstone and Dolan, *clearly did not kill everyone over a large area irrespective of the kind of building they were in*. Brode on page 426 cites inaccurate unclassified summary U.S. Strategic Bombing Survey reports on Hiroshima and Nagasaki, apparently published with deliberate omissions of vital data in an effort to coerce Stalin with nuclear fear-based deterrence. The secret (now declassified) full version of the report contains the detailed truth about the firestorm origin in Hiroshima being due to blast-overturned charcoal braziers in wooden houses, showing that even black colored curtains rarely caught fire due to the

thermal flash even near ground zero, and survivors were easily able to extinguish the fires in a modern concrete Bank of Japan building near ground zero in Hiroshima using buckets of water. These vital civil defense findings on fire in Hiroshima by the U.S. Strategic Bombing Survey investigation in Hiroshima were omitted from the brief propaganda report Truman published, and are only included in the full three volume secret Pacific Theatre USSBS report number 92. Secrecy has thus led to tragic disinformation campaigns.



A Must-Read for Historians

A rare, informed insider's perspective on significant events in The Cold War.

"Harold Brode probably knows more about nuclear weapons effects than any other person alive." - Phillip F. Schewe, Physics Today, vol. 58.

Dr. Harold L. Brode is a Ph.D. in Theoretical Nuclear Physics from Cornell University. He pioneered computer simulations of nuclear explosions and for years was an active consultant at Los Alamos National Laboratory.

Dr. Brode is co-founder of R&D Associates, a research company employed by the Atomic Energy Commission and the Defense Department. He was a long-time member, and chaired 12 sessions, of the U.S. Defense Nuclear Agency's Scientific Advisory Group (SAGE). He was a member of the White House Engineering Advisory Group and attended numerous conferences on Presidential Protection at Camp David.

In February 1997, the Defense Special Weapons Agency, successor to the Defense Nuclear Agency, presented Dr. Brode with its Lifetime Achievement Award, the agency's highest award for public service, stating that he had, "achieved near legendary status as an expert in nuclear weapons effects."

Dr. Brode has spoken on the "Effects of Nuclear Weapons" in more than 25 countries and has authored 311 publications.

After a detailed review of German nuclear weapons research, Brode details the science of implosion type nuclear weapons during the American Manhattan Project of World War II. Gun type assembly (used at Hiroshima) was not feasible for the heavy plutonium isotope 239 contaminated by isotope Pu-240 which has a high spontaneous fission rate because (page 69):

> "To get the plutonium to a super-critical state before it blew itself apart required a critical mass assembly at speeds of more than 6 miles/sec (~ 31,700 ft/sec) – much faster than simple howitzer devices could have managed."

He adds that John von Neumann's Mach wave reflection theory (pages 70-1):

> "… convinced his fellow scientists at Los Alamos that the blast from a nuclear burst would be greatly enhanced if its shock wave were to reflect off the

> ground from a burst height high above the target … the four radars in each weapon were wired in pairs, so either one pair of the other could trigger the weapon when both radars in one pair or the other agreed that the right altitude had been reached, so they would not detonate prematurely. In addition … a barometric fuse, set to go off at a somewhat lower altitude, was included as a further backup." (The detail about the radar fuses comes because his uncle, Robert B. Brode, was on the Manhattan Project and developed the bomb's radar fuse systems.)

John von Neumann's second contribution, after selecting the air burst altitude, was to apply mathematics to Seth Neddermeyer's implosion theory for the Trinity and Nagasaki weapons (pages 71-2):

> "In fact, von Neumann and Robert Richtmyer invented (and later published) a numerical scheme that proved essential to many such subsequent calculations, and has been in wide use at weapons laboratories and elsewhere ever since. Subsequently, in doing my own calculations of both nuclear and high explosive blast waves, I employed von Neumann's and Richtmyer's ingenious 'artificial viscosity' scheme. Their technique allowed computer programs to numerically integrate right through shock wave discontinuities, and still accurately represented the physics and hydrodynamics of explosive phenomena."

Brode points out that the Neumann-Richtymer technique for computing implosion system behavior (with smothing over discontinuities by the use of artificial viscosity) was published openly by Pergamon Press of New York under the heading "The point source solution" in volume 6 of a compilation of von Neumann's works edited by A. J. Taub in 1963. So much for the secrecy of computer models of implosion bomb physics. Anyone can numerically integrate the Neumann-Richtymer equations for any implosion system in Fortran on any modern computer!

The major British contribution to the Manhattan Project was James Tuck's argument in April 1944 to use high explosive "lenses" to focus point source detonation waves by modifying the speed of the detonation wave by the use of shaped charges of fast and slow-burning explosive. The effect is exactly the same as the way light is refracted by the effect of a shaped lens of glass slowing down light relative to its speed through the air. (Being denser, glass has a higher electron charge density than air, thus "loading" the photons passing through glass with more electromagnetic field interactions, which slows down light.) Explosive lenses reduce the number of detonators needed for implosion and make the compression of the core more uniform (page 82): "… X-ray images showed successful compressions of the heavy metal cores without any of the devastating jetting that had been feared and was so important to avoid."

THE COLD WAR PERIOD

Dr Brode begins this with a review of the Russian spying in the Manhattan Project. He explains that, apart from the well-known spies like Alan Nunn May, Klaus Fuchs, David Greenglass, and the Rosenbergs, who sold the principles of bomb design, others like George Koval – finally recognised by Putin in 2002 for stealing American secrets – gave Stalin the vital U235 gaseous diffusion barrier design used at Oak Ridge (pages 92-3):

> "In recent times, Russian President Putin awarded posthumously the highest Russian award to George Koval … Koval was born in Iowa in 1913 … his parents emigrated to a Siberian establishment … he was then trained by the GRU for his role as a spy. And he returned to the US in 1940. As an American citizen, with no trace of a foreign accent, he was subsequently drafted … Koval was sent back to school at the City College of New York in the Army Specialized Training Program … Later … assigned … to support the Manhattan Project. While in that assignment, he also learned details of the Oak Ridge operations … Koval continued to spy in the US from 1940 to 1948 … Only years later did his spying activity become known in the United States."

Dr Brode points out on page 119 that 63% of the total cost of the Manhattan Project ($1.89 billion in 1944 dollars, or $27.3 billion in 2006 dollars, allowing for inflation) was spent on the massive Oak Ridge plants for U235 separation by the gaseous diffusion process, pumping acidic UF6 gas at high pressure through porous nickel barriers. The plant was the first wide scale use of teflon, which coated all the compressor pumps to avoid corrosive destruction from UF6. The barriers themselves were acid etched from a tin-nickel alloy, and later by fusing powdered nickel together, developed to optimally withstand the gas pressure while allowing the lighter and faster U-235F6 molecules to diffuse through, without dissolving due to the acidity over a 6 month operational life. (There are some minor typographical errors in the book like commas out of place occasionally, and on page 129 the error occurs that 5% of natural uranium is U235; of course 0.71% of natural uranium is

U-235, **unless it has been depleted as in the natural nuclear reactors of Oklo, Gabon, whose waste has been safely confined for 1.7 billion years, to the annoyance of the anti-nuclear folk**.)

After discussing the spies, Brode moves on to secrecy during the hydrogen bomb program, and his personal interactions with Robert Oppenheimer, Director of wartime Los Alamos, who was a personal friend of Brode's uncle, the Manhattan Project physicist Robert B. Brode, 1900-86 (page 134):

> "I first met Robert Oppenheimer and his wife Kitty at my Uncle's home in Berkeley. My aunt and uncle were close friends of the Oppenheimers and the Fermis, and, of course, with the many other scientists who had been a part of that wartime effort. In 1948 I attended Oppenheimer's graduate seminar on nuclear physics … I found him impatient and even rather sarcastic, especially with students who dared to ask questions."

Dr Brode did his PhD in Theoretical Nuclear Physics at Cornell from 1948-51 under supervision of his thesis advisor and PhD Committee Chairman, the celebrated Nobel Laureate Hans A. Bethe. It was Bethe who first tried to calculate the nuclear fusion rates in stars prior to WWII, and who with Freeman Dyson in 1947 persuaded Oppenheimer of the validity of Feynman's path integral approach to calculating the Lamb shift in the hydrogen atom's ground state energy level. Brode points out that Bethe had been the theoretical group leader at Los Alamos (leading to lifelong friction between Teller and Bethe, stemming from the low priority of H-bomb research during WWII). While minimising H-bomb research during WWII to the irritation of Teller, Bethe did some early studies of nuclear weapons effects while at Los Alamos, e.g. fireballs, blast wave pressures, and thermal radiation pulses (see Bethe's Los Alamos report **LA-2000**, or LA-1020 for fuller details). Brode explains on page 338 that prior to the Teller-Ulam hydrogen bomb design of March 1951 which employed X-ray coupling between separate stages, Bethe opposed the H bomb on three arguments in his seminar on the subject:

> "In the first part, he explained why a thermonuclear weapon was physically impossible, a view that turned out to be spectacularly wrong. In the second part, he hypothesized that even if they were feasible, there was no need … In his concluding section (in case audiences were not convinced by the first two points), he spoke of the immorality ... they were not persuasive enough to lead President Truman [who authorized the H bomb development program before the Teller-Ulam discovery, much to the fury of many orthodox scientists who wanted a plan to implement instead of a program that begins with fumbling for ideas in the dark] or the U.S. Congress to forego post-war funding for thermonuclear research. "

Bethe, states Brode on page 339, was a complex man, opposing the further development of nuclear weapons in the united states, despite the failure of the small postwar nuclear stockpile to prevent the Berlin Blockade of 1948, the Red revolution in Czechoslovakia, the Korean War outbreak in 1950, etc.

RICHARD P. FEYNMAN

During Brode's PhD research at Cornell, he had a job as a graduate assistant, grading papers from students of Bethe, Richard Feynman, and others (page 142):

> "In my job as a graduate assistant … I seldom got much guidance from Professor Feynman. For him, I had to define the 'correct' answers for myself and then defend them with no help from him. My problem was that his exam questions were often a bit obtuse and seldom led to simple answers."

EDWARD TELLER

After discussing Edward Teller's testimony to the 1954 Oppenheimer security hearings, in which Teller cast doubt on Oppenheimer's motivations because of his resistance to the H-bomb even after Russian exploded a nuclear weapon in 1949, Brode suggests (pages 145-6):

> "… Dr Teller was credited with influencing then-President Reagan to sponsor research into advanced technology for shooting down Soviet ICBMs [Strategic Defense Initiative, SDI; or "Star Wars" in President Reagan's language] … So, perhaps the world should also give some credit to Edward Teller for his contribution to the successful end to the Cold War, because that SDI or Star Wars effort did force the USSR to pursue vastly more

expansive and expensive research … These efforts placed inordinate demands on the Soviet defenses and further strained their already overburdened military budgets. …

"Edward Teller was a frequent consultant at RAND … Teller would hold daily marathon seminars, where he probed ideas for new thermonuclear weapons designs. These were rather informal gatherings that frequently went on all day long … He would often suggest as many as half a dozen or more ideas during the course of a single day, and one or more of us would inevitably be designated to go off and more thoroughly investigate his suggested innovations. … this man was a true genius, and some of his ideas proved invaluable. Unfortunately, out of his plethora of concepts and suggested avenues of research, only a few proved worth further pursuit, but, as that old hand put it: 'Who among us has even one good idea per day, or per week, for that matter?'"

JOHN VON NEUMANN

Brode describes on how he at RAND Corporation beat computer innovator John von Neumann in 1955 publish (Journal of Applied Physics, v26, n6, pp766-75) the first full electronic computer solutions to point source, free air blast waves, using von Neumann's own artificial viscosity equation (page 147):

"… with excellent support at RAND, I managed to produce results that von Neumann was still trying to squeeze out of an early electronic computer at Princeton for the Institute for Advanced Studies. I had scooped the one true expert!"

ISADOR RABI AND EUGENE WIGNER

After the Cuban Missiles Crisis of 1962, Harold Brode was recruited by Nobel Laureate Eugene Wigner to determine the efficiency of civil defence countermeasures against nuclear weapons effects, in Project Harbor, which was ignored by people like Bethe, and was opposed by Isador Rabi (page 148):

"After the war, Rabi was appointed to the General Advisory Council for the first Atomic Energy Commission, and subsequently served as a member of The Presidential Science Advisory Committee (PSAC). In 1963, during a review of the National Civil Defense Program before the PSAC … in a conference room in the White House Executive Office Building … right after the Cuban Missile Crisis, when many citizens felt the imminent threat of nuclear war … Dr Rabi did not favor the Civil Defense findings that Wigner, Teller and others of us were espousing. Thus, while Wigner made his presentation, Rabi sat at the opposite end of that great PSAC conference table and read a newspaper, loudly turning pages while he held the paper up in front of himself, thereby making certain everybody could see … Wigner was deeply offended by Rabi's obvious scorn."

THE SAFETY SYSTEMS OF THE FIRST NUCLEAR WEAPONS

Brode deals with permissive action links to physically prevent unauthorised use of nuclear weapons, and the safety of nuclear weapons in accidents. He begins with a detailed discussion of the safety of the Hiroshima and Nagasaki weapons, both of which used special radar circuits and a backup barometric circuit developed by a team led by his uncle, Robert B. Brode (pages 153-4):

"… it is not surprising that the fusing of each weapon was designed with a succession of safety and redundancy measures: First, a safety tape was pulled out when the bomb was released from the bomb bay, and that started a timer set for fifteen seconds. That was to avoid premature detonation … That mechanism also turned on the power to each bomb's radar fuses. Secondly, a barometric sensor delayed the functioning of the radar sensors … Thirdly, a set of four radar fuses were set to sense the appropriate distance to the ground … Each pair was wired in series so both radars in either pair had to agree that the selected altitude had been reached before the weapon would detonate, thus assuring a high probability … There was, of course, also a non-radar backup, another barometric fuse …"

MICROCHIP, COMPUTER, INTERNET, GPS, TEFLON, ETC. FROM WAR RESEARCH

Brode explains how hydrogen bomb improvements financed early computer development (page 163):

> "In a kind of synergism, the development of high-speed computers had been stimulated by the computational needs of the nuclear weapons developers. The ability to carry out complex and repetitive numerical calculators was vital to their weapon research. Consequently, for some years, nearly all the first new electronic computers went directly to the Los Alamos Laboratory …"

The space race of course was driven by the fear of the Russian ICBM, which Russia successful tested first (in adition to the first satellite in orbit, Sputnik). Brode explains how carbon-based plastic ablation shields proved vital to protect ICBM warheads during re-entry. These plastics were used by Edward Teller as sheet type "radiation mirrors" to protect the inside of the casing of a nuclear weapon from destruction by X-rays, while reflecting X-rays from the fission stage to the fusion stage. The surface of the plastic is an insulator so it absorbs X-ray or heat, re-radiates from the surface layer, and ablates, without transmitting heat or the recoil pressure that a dense metal produces in ablation (pages 190-1):

> "Only after years of experimentation did the missile designers develop lightweight ablative carbon phenolic heat shields. These light plastics, being poor conductors of heat, i.e., good insulators, protected the inner workings of the missiles, even while getting so hot on their surfaces as to vaporize. Their outer surfaces would evaporate and blow away, thus effectively carrying off the heat generated by re-entry."

As noted, Teflon was first manufactured for the Oak Ridge UF6 gas pumps, high-speed computers for H-bomb design and military code breaking, internet to RAND's Arpanet to allow communications after an EMP in nuclear war by routing messages by any available cables (without a single central hub). Microchips and GPS were first funded to develop miniature guidance systems for accurate missiles (pages 195-6):

> "Our first true ICBM, the ATLAS, became operational in 1959 … In the beginning, this long-range missile was unreliable, inaccurate, and extremely vulnerable. … In October of 1959 the first ATLAS missiles went on combat alert, armed with its 3.8-MT nuclear warhead. … IRBMS were added to our Armed Forces to augment the shrinking roles and diminished capabilities of the tactical bombers. … submarine-launched ballistic missiles (SLBMs) such as Polaris and Poseidon missiles also became operational."

Brode explains on page 197 that ATLAS-D and –E missiles were hardened to 25 psi peak overpressure by simply storing them "horizontally in covered underground pits" before launch. (This caused delays because ATLAS was liquid fuelled, but all modern missiles use solid fuel and can easily be stored sideways.) The first unlined vertical silos gave the ATLAS an impressive 100 psi peak overpressure protection (roughly survival at the fireball radius and near the crater edge for wet soil and small yields). Later silo development using linings of shock absorbers gave really large increases to missile hardness. This increasing hardness meant that to destroy the missile in the silo by a first strike, you needed either a much higher yield or a much more accurate missile delivery system, thus driving the development of satellite GPS missile guidance and tiny high-speed computers, employing integrated circuits. By 1963, Brode reports on page 198, TITAN-II missile silos were capable of surviving inside a nuclear fireball, at a peak overpressure of 300 psi. The silo would be sited in rock to minimize crater shock effects. Finally, MINUTEMAN missiles arrived which were designed to take 1,000 psi peak overpressure.

It was this survivability of close-in nuclear weapons effects, as calculated by Brode, that guaranteed American retaliation capability and so deterred Russia, in the event that the submarines were tailed and torpedoed. As the Russians surged ahead in the arms race, the thousand MINUTEMAN missiles were upgraded with additional shock absorbers in the silos and multiple independently targetable (MIRV) and decoy warheads like chaff wire and metal foil balloons shaped like warheads to statistically saturate Russia's Galosh ABM system around Moscow.

BRODE ON SAM COHEN'S HIGH ALTITUDE BURST IDEA

Dr Brode gives a personal account of his own accidental over-exposure to 200 rads of dental X-rays to his head, which stopped his beard growing for a month. Personal experiences too of attending nuclear weapons tests in the Nevada desert helped to motivate his studies of fellow RAND Corporation physicist Sam Cohen's

neutron bomb and high altitude bursts for defensive shields without blast damage (pages 220-221):

> "But Sam was an ever-imaginative contributor to the nuclear weapons business. And later, when thermonuclear weapons of megaton yields became a reality, he also envisioned the use of very large-yield weapons … high above the atmosphere … He reasoned correctly that the blast from such a space burst, detonated at such a high altitude, would cause little or no blast damage on the ground."

Sam Cohen was arguing for space burst nuclear weapons to shoot down Russian bombers or missiles while they were still airborne, a question that ultimately led to the Starfish test and the high altitude EMP discovery, and to Edward Teller's Star Wars project that precipitated the end of the USSR.

Brode also includes numerous summary tables of nuclear weapons data, listing nuclear crises, nuclear accidents, nuclear tests, etc. For example, Brode explains on pages 291-2 that the CIA assessed the risk of a Syrian-Egyptian invasion of Israel as non-existent when they attacked on 6 October 1973. Israel responded to the attack by assembling 13 nuclear weapons in an tunnel under the Negev desert and as Syrian tanks swept in across the Golan Heights, on 8 October 1973, Israeli Prime Minister Mrs Golda Meir authorized Defense Minister Moshe Dayan to activate the 13 Israeli nuclear warheads and distribute them to air force units. Brode comments on page 292:

> "The fact that Israel was known to have nuclear weapons, and would likely use them against attacking countries if it was about to be overrun, must have weighed heavily on the Syrian and Eygptian planners and may have influenced the limited nature of their objectives. ... The existence today of perhaps hundreds of nuclear weapons in the Israeli arsenal may be serving currently as a sobering deterrent to any such possible further aggression in the region. This Israeli nuclear arsenal poses a definite obstacle for neighboring countries (such as Iran) that might otherwise contemplate attacks aimed at the destruction of Israel. But, it is also quite possible that the early existence of an Israeli nuclear capability had served as a motivation in Iran's apparent interest in developing its own nuclear weapons arsenal."

The crisis escalated further on 24 October 1973 when President Nixon, preoccupied with Watergate, left Henry Kissinger to order a DEFCON-3 alert which prepared American B-52 nuclear bombers for war, after intelligence reports indicated that Russia was preparing to defend Egypt in its war with Israel. Thus, if Israel had dropped nuclear weapons on Egypt and Syria, as it prepared to do, then Russia would have retaliated against Israel, and America would have gone to Israel's assistance, possibly escalating to a general nuclear war (Henry Kissinger's early view on tactical nuclear war in his controversial 1957 book *Nuclear Weapons and Foreign Policy* was that any nuclear weapon below 500 kilotons yield or air burst averts serious fallout, and may be more decisive and less costly in human lives than a protracted conventional war).

The Quemoy and Matsu crisis of the 1950s is analogous in some respects to the crisis of the China versus Japan today over the Senkaku Islands. Chiang Kai-Shek moved 78,000 Taiwanese troops to the Taiwan Islands of Quemoy and Matsu to protect those islands from a threat of Chinese invasion. China then shelled the islands and shot down an American military aircraft in the vicinity, capturing the crew. The U.S. Joint Chiefs of Staff then recommended to President Eisenhower than Secretary of States John Foster Dulles the use of nuclear weapons to retaliate against China. The threat of nuclear attack caused China to stop shelling the islands and release the captured Americans. Brode also discusses the Suez crisis of 1956, although from a biased American point of view whereby Egypt closed the Suez Canal and then Israel, France and Britain invaded Egypt illegally in revenge, before Eisenhower forced them to withdraw and leave Egypt alone. In fact, Eisenhower had pre-empted the nationalizing of the Canal, by first offering Egypt a loan for the building of the Aswan Dam, and then withdrawing the offer of the loan when Egypt refused to side with America in the Cold War. Egypt nationalized the British Suez Canal to pay for the Dam because America tied the loan to political considerations. Brode correctly concludes on page 268 that after Eisenhower intervened: "the winner was the Soviet Union. The French and British backed down under U.S. pressure. And France felt the onus of being without its own nuclear cards to play."

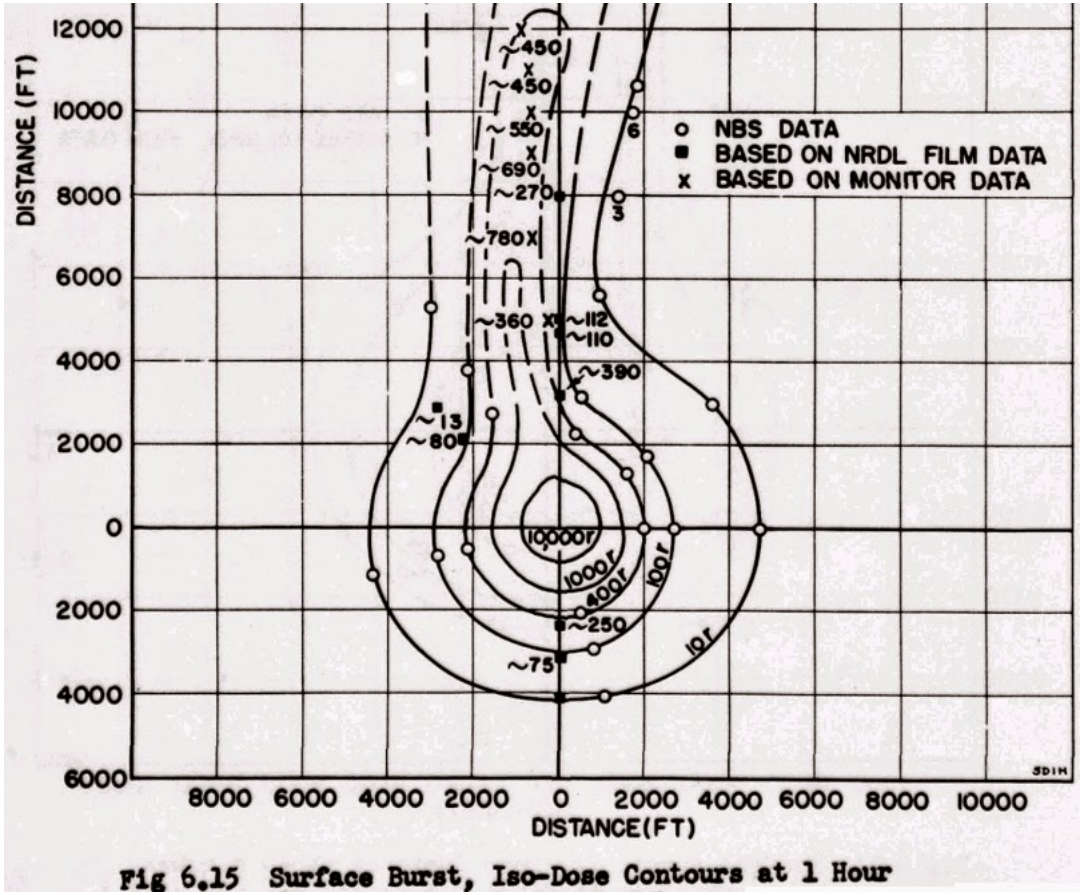
It is clear that such events cause nuclear proliferation, as in the case of France. The leading French H-bomb designer Robert Dautray was a holocaust survivor who in 2007 explained his work in terms of the holocaust: "Their non-violence led them to death." (The father of the bomb finally reveals his secrets, by Bernard Le Solleu, *Ouest-France,* March 17, 2007, p. 42.)

There is no mathematical physics included, but you can find Dr Brode's reports **online at RAND Corp.**, the **Annual Review of Nuclear Science v18**, and by **searching the DTIC database for Harold Brode**.

Links to some newly-released declassified nuclear weapons effects reports vital for civil defense:

Louis Costrell, *Operation JANGLE: Nevada Proving Grounds, October-November 1951, Gamma Radiation Measurements,* Jangle Sugar (1.2 kt surface burst) and Jangle Uncle (1.2 kt shallow earth penetrator type underground burst), weapon test report: WT 329, ADA078575 (PDF of document downloadable from the DTIC page is **linked here**):

> Gamma ray dosage rates were determined as a function of time and distance. The method of measurement and the equipment used is described. Dose rates as a function of time were obtained for 27 stations on the surface burst and for 29 stations on the underground burst. Total dose data was obtained by integration of the dose rates. Dose rate and integrated dose as a function of time are presented for all of the stations. One hour dose rate contours are presented as well as 10 minute, 1 hour, and 10 hour integrated dose contours. All of the above mentioned data is presented in the form of curves. In addition 10 second dose versus distance curves for the surface and underground bursts are presented on a single graph for ready comparison.



Jangle Sugar 1 hr dose pattern graph WT 329

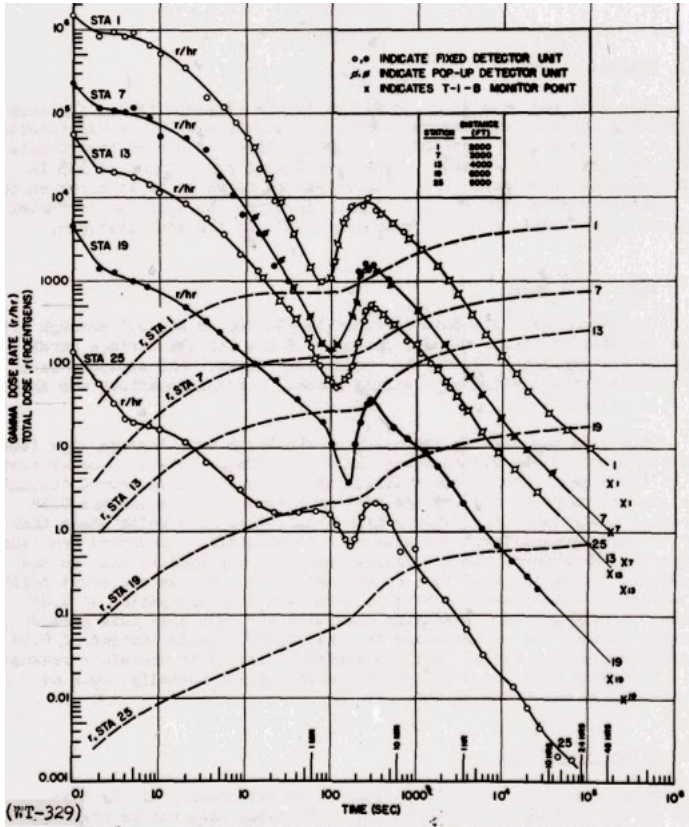


Fig 6.1 Surface Burst, Dose Rate and Total Dose vs Time (Dose received in first 0.1 second not included. See para 6.3. Station locations on Fig 1.1.)

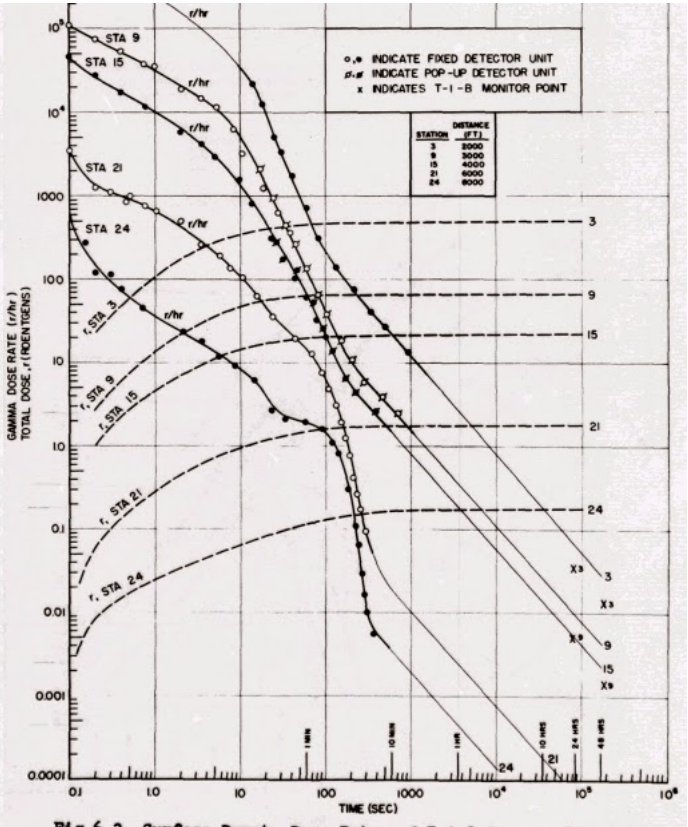


Fig 6.3 Surface Burst, Dose Rate and Total Dose vs Time (Dose received in first 0.1 second not included. See para 6.3. Station locations on Fig 1.1.)

Jangle Sugar dose rate graphs WT 329

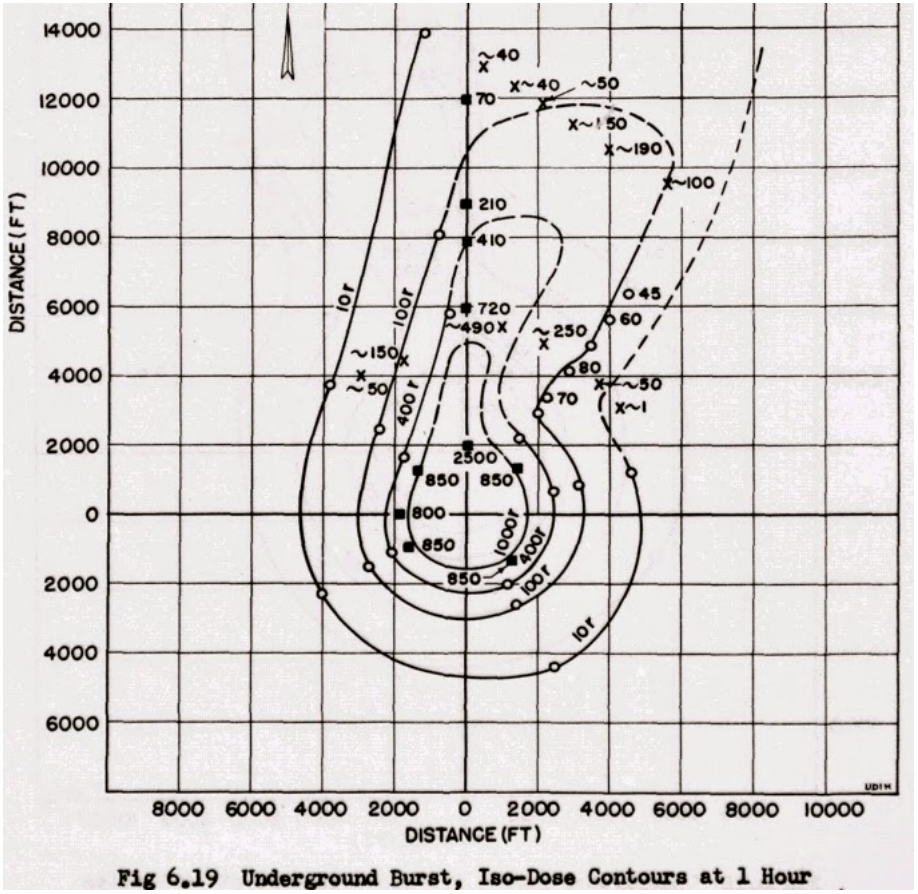


Fig 6.19 Underground Burst, Iso-Dose Contours at 1 Hour

Jangle Uncle 1 hr dose pattern graph WT 329

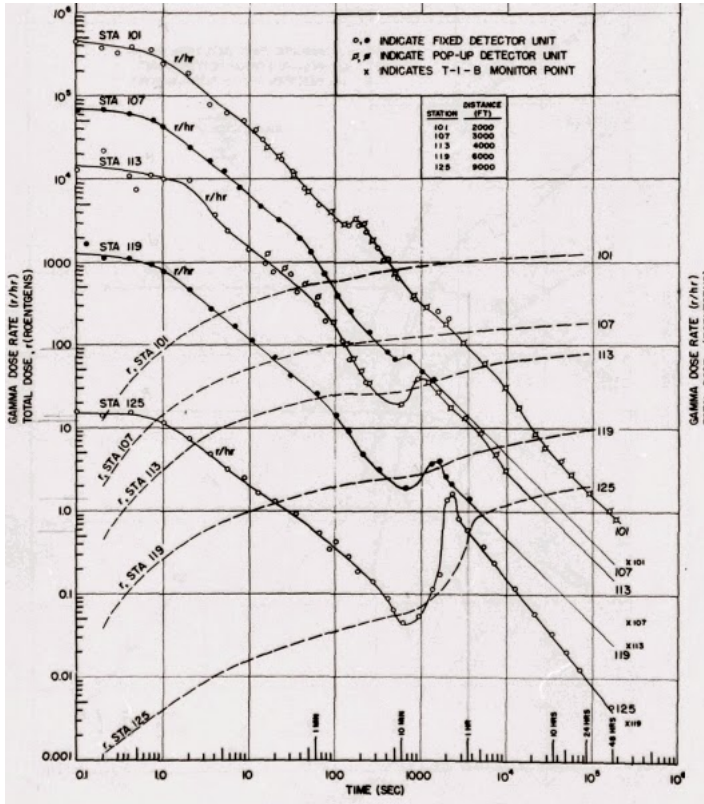


Fig 6.7 Underground Burst, Dose Rate and Total Dose vs Time (Dose received in first 0.1 second not included. See para 6.3. Station locations on Fig 1.2.)

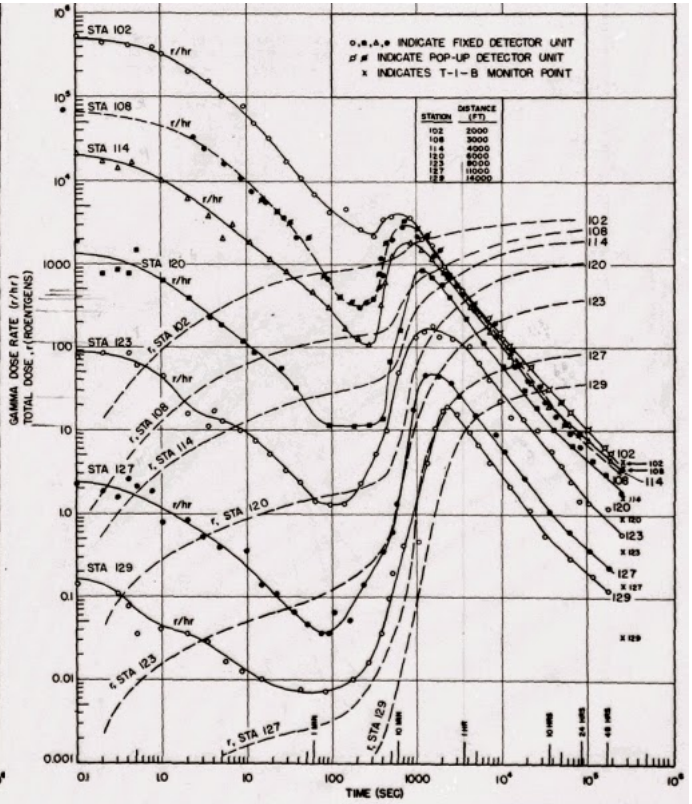


Fig 6.8 Underground Burst, Dose Rate and Total Dose vs Time (Dose received in first 0.1 second not included. See para 6.3. Station locations on Fig 1.2.)

Jangle Uncle dose rate graphs WT 329

John S. Malik, *Operation Buster-Jangle: Project 10.6. The Measurement of Gamma-Ray Intensity vs Time,* ADA995063 (PDF of document downloadable from the DTIC page is **linked here**):

> Gamma-ray intensity vs. time data in the range from a few milliseconds to about 20 sec were obtained on tests C and E of Operation Buster and the underground test (Shot F) of Operation Jangle. The equipment consisted of a detector consisting of a solution of terphenyl in toluene surrounding a coaxial phototube, the output of which was fed into a 5.5-decade pseudo-log circuit which in turn was direct-coupled to the plates of a 3-in. battery-operated scope tube. The face of the scope was photographed with a 16-mm strip-film camera. The data seem to indicate that the source of the gamma radiation for these times is due to neutron capture in the nitrogen of the air, followed in about 0.2 sec by gamma rays from the decay of fission fragments, the latter modified by shock hydrodynamics and rise of the fireball.

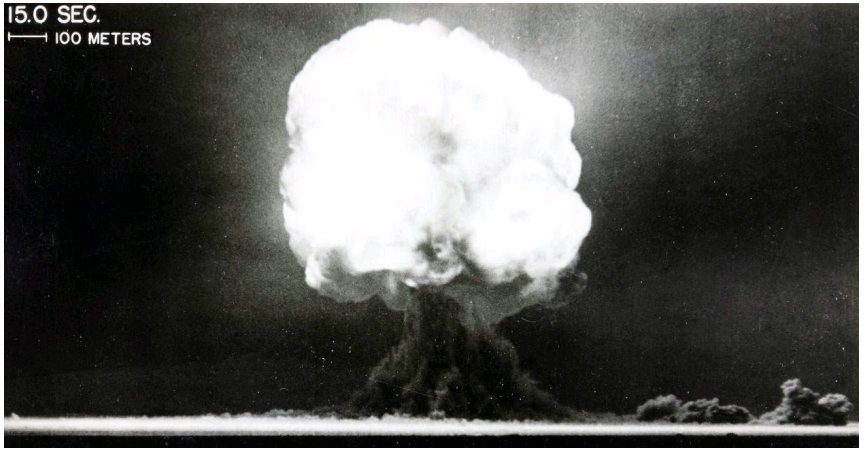
Richard K. Laurino and I. G. Poppoff, *Contamination Patterns at Operation JANGLE,* ADA078578 (PDF of document downloadable from the DTIC page is **linked here**):

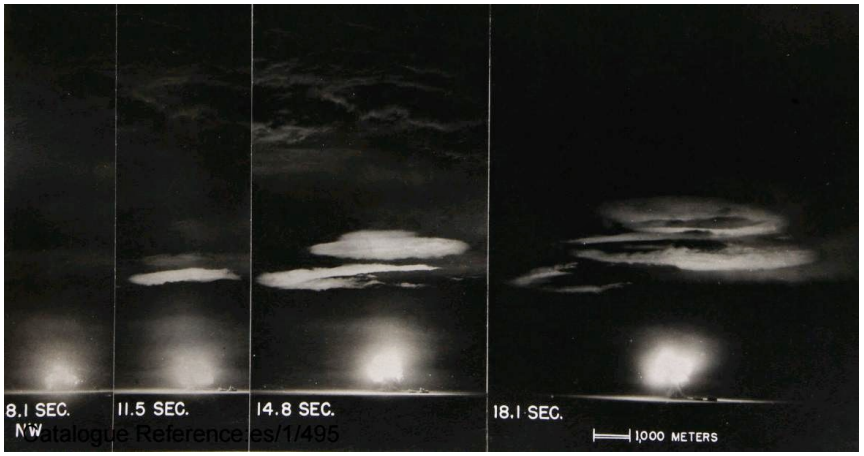
The distributions of contamination resulting from bursts at Operation JANGLE have previously been represented on maps as iso-intensity contours. This report uses the data and maps of three projects, and combines this information. The result is two modified iso-intensity maps-one for the surface burst at Operation JANGLE, and one for the underground burst. These modified iso-intensity patterns are believed to be more useful than the maps which were previously made because a wider range of intensities is presented.

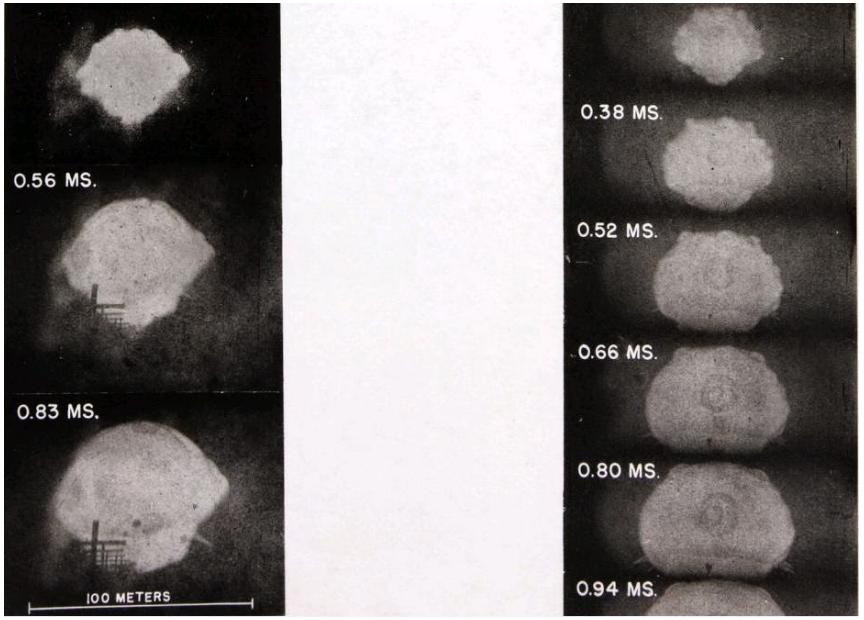
Boeing Corporation, *Nuclear Weapons Effects Seminar* Document Number D500-11659-1 April 10, 1987, ADA211928. Edited by Tom Hewlett and Bob Haney:

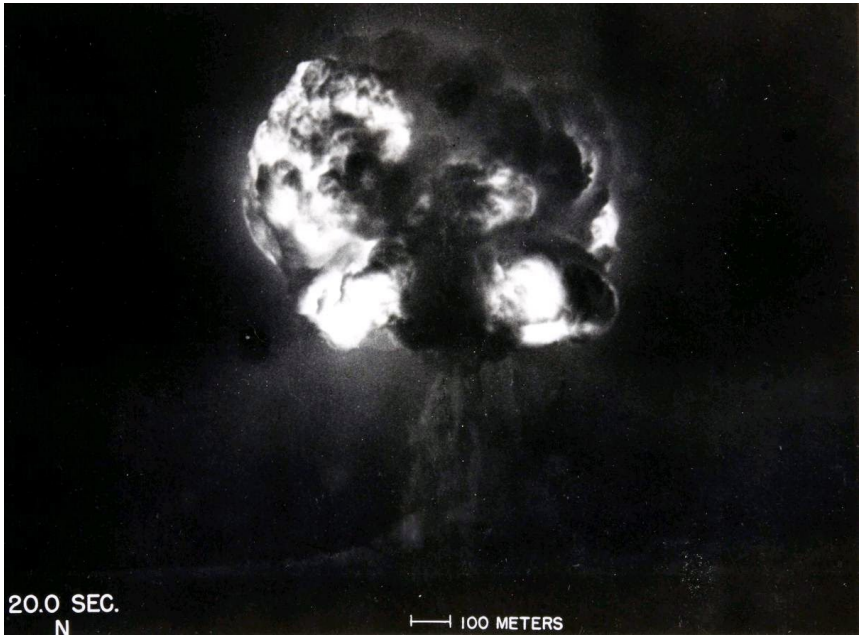
The purpose of the seminar is to provide the following information to newly assigned MMEAS survivability engineers: a. An awareness of the magnitude and complexity of the varied nuclear threats. b. An overview of general and specific Air Force policies and procedures in these areas: 1. A.F. Tech Order system 2. Maintenance Data Collection system 3. Hardness Maintenance/Hardness Surveillance 4. Configuration control. c. A detailed look at the electronic threat, Electromagnetic Pulse (EMP), and how to safeguard against it. d. Methods of detecting degradations in the hardness of a system or sub-system through testing and inspection.

There are also some declassified British documents on nuclear weapons at the U.K. National Archives. For example ES 1/495 gives high quality *Trinity* nuclear test photos sent to AWRE at Aldermaston by Los Alamos, which are not always easy to obtain elsewhere, and there is an interesting declassified Top Secret paper called ***The Rationale for the United Kingdom Strategic Nuclear Deterrent Force,* DEFE 5/192**:









THIS DOCUMENT IS THE PROPERTY OF HER BRITANNIC MAJESTY'S GOVERNMENT

The circulation of this paper has been strictly limited.
It is issued for the personal use of C/L

TOP SECRET

UK EYES ONLY

Copy No. 51

COS 45/72

Copy No 51 of 55 copies

Special Distribution

MINISTRY OF DEFENCE

CHIEFS OF STAFF COMMITTEE

THE RATIONALE FOR THE UNITED KINGDOM STRATEGIC NUCLEAR DETERRENT FORCE

Note by the Secretary

1. The Chiefs of Staff have approved (1) the report (2) at Annex A and have agreed to forward it to the Secretary of State as an expression of their views.

B G T STANBRIDGE
Air Commodore
Secretary
Chiefs of Staff Committee

UK NATIONAL ARCHIVES, Document Ref: DEFE 5/192

TOP SECRET UK EYES ONLY

ANNEX A TO
COS 45/72

THE RATIONALE FOR THE UNITED KINGDOM STRATEGIC NUCLEAR DETERRENT FORCE

INTRODUCTION

1. Current Government policy is that we should possess a strategic nuclear capability; studies are in hand on the form that this should take in the future and the degree of collaboration with other nations which may come to appear politically and technically desirable or essential. Decisions have also been made or are pending on the matter of United Kingdom nuclear weapons systems and delivery means relevant to nuclear action below the level of strategic response (1). For the United Kingdom to continue to be a nuclear power will inevitably involve large expenditure over a considerable period.

PHILOSOPHY OF NUCLEAR DETERRENCE

Strategic Weapons

8. For the purpose of this paper we use the following definition:

"Deterrence implies the evident ability to inflict on the Homeland of a potential aggressor a degree of damage he would not regard as tolerable in the context of the objectives he might wish to obtain; together with the creation of sufficient belief in his mind that this damage might, in fact, be inflicted."

9. There is no universal and absolute criterion of what sustains effective deterrence. This paper concerns deterrence applicable to a leading power of the second rank - the creation of a state of mind in the potential enemy which will deter his Aggression. Deterrence is not concerned with the use of nuclear weapons because by definition if war occurs deterrence has failed. It is concerned, therefore, not with the course of hostilities but with their prevention.

The Rationale for the United Kingdom Strategic Nuclear Deterrent Force, DEFE 5/192

12. In the second place strategic nuclear weapons provide one of the elements of deterrence against conventional attack. There are two qualifications to this thought. First, it may be argued that the deterrent effect of the strategic weapon diminishes as the enemy threatens objectives less essential to the security of the possessor. Second, as a corollary, strategic nuclear action as a response - or threatened response - to conventional attack upon an ally's territory rather than the possessor's own may reasonably be regarded as less credible. "Credible" means "credible at all times in the face of the enemy capabilities". The credibility level is therefore inevitably high.

13. However, some capability for strategic nuclear action, because it constitutes the upper limit of military response, is clearly not only one of the elements of deterrence against conventional attack but the crowning element, since it alone can threaten the homeland of the aggressor with unacceptable damage. Deterrence, in the round, consists in providing for those measures which can make that threat credible, and is weakened by any measures - or lack of them - which could reduce credibility.

TOP SECRET UK EYES ONLY

ANNEX A TO
COS 45/72
(Continued)

ESSENTIAL CHARACTERISTICS OF A UNITED KINGDOM STRATEGIC NUCLEAR DETERRENT

General

47. We now consider the essential characteristics which a British strategic nuclear deterrent should possess in order to produce a sufficient level of effectiveness to deter Soviet aggression.

48. It is convenient at this point to repeat the description of deterrence with which we began this paper:

"Deterrence implies the evident ability to inflict on the Homeland of a potential aggressor a degree of damage he would not regard as tolerable in the context of the objectives he might wish to obtain; together with the creation of sufficient belief in his mind that this damage might, in fact, be inflicted."

49. For our ability to be evident two things would be required: our weapon system must be known to be sufficient for their tasks; and since it must be made clear to an enemy that these systems would survive any attempt at pre-emptive strike, our retaliatory capability must be invulnerable. The creation of belief in the mind of the potential aggressor that he would sustain unacceptable damage demands that he could neither be certain to defend himself from it nor certain to be able to destroy it by pre-emptive attack. He must also be brought to believe that our will would not fail.

69. Although our review has considered exclusively deterrence to Soviet action, it has been assessed (5) that a modest increase to any future strategic force would probably suffice to provide the capability additionally to deter lesser powers from threat or blackmail, with the possible exception of China; alternatively the United Kingdom's tactical nuclear capability might be suitable for this purpose. The amount and type of damage required to deter China would need separate assessment if and when a threat to the United Kingdom from China is discerned. Any resulting requirement for a capability to deter China would have to be examined in the light of the strategic nuclear capability to be provided for the deterrence of the Soviet Union.

CONCLUSIONS

70. The main justification for the possession of a nuclear deterrent is to provide the ultimate guarantee of national security and sovereignty, and to protect national interests where conventional defences are no longer effective. Without it, the United Kingdom has no means of its own of deterring nuclear attack or large-scale conventional aggression by a nuclear power, and countering nuclear blackmail. We would view such a situation with the gravest misgivings.

Note:

5. LTWP Study Group L07/102/37/16/4980.

A - 17

Catalogue Reference:defe 5/192 TOP SECRET UK EYES ONLY Image R

TOP SECRET UK EYES ONLY

ANNEX A TO
COS 45/72
(Continued)

A British deterrent force is of value in NATO in that it ovides the Alliance with a European contribution to the overall errent, and a second centre of decision for nuclear retaliation. er than France no European member possesses this capability. If ritish deterrent force did not exist, the United States would have onopoly of NATO's nuclear power. Conversely the necessity for such uropean element becomes stronger as the American nuclear guarantee omes progressively less credible.

In both contexts the value of the British deterrent depends upon decision to use it remaining under unfettered national control, for this to be clearly seen to be so. There is no justification maintaining a force which is purely an adjunct to the United tes' deterrent and the use of which is entirely under American trol. Our present dependence on the United States for material

UK NATIONAL ARCHIVES, Document Ref: DEFE 5/192

The Rationale for the United Kingdom Strategic Nuclear Deterrent Force, DEFE 5/192

THE EFFECTS OF THE ATOMIC BOMBS AT HIROSHIMA AND NAGASAKI

REPORT OF THE BRITISH MISSION TO JAPAN

40. The provision of air raid shelters throughout Japan was much below European standards. Those along the verges of the wider streets in Hiroshima were comparatively well constructed : they were semi-sunk, about 20 ft. long, had wooden frames, and 1 ft. 6 ins. to 2 ft. of earth cover. One is shown in photograph 17. Exploding so high above them, the bomb damaged none of these shelters.

41. In Nagasaki there were no communal shelters except small caves dug in the hillsides. Here most householders had made their own backyard shelters, usually slit trenches or bolt holes covered with a foot or so of earth carried on rough poles and bamboos. These crude shelters, one of which is shown in photograph 18, nevertheless had considerable mass and flexibility, qualities which are valuable in giving protection from blast. Most of these shelters had their roofs forced in immediately below the explosion ; but the proportion so damaged had fallen to 50 per cent. at 300 yards from the centre of damage, and to zero at about ½ mile.

Photo No. 17. HIROSHIMA. Typical, part below ground, earth-covered, timber framed shelter 300 yds. from the centre of damage, which is to the right. In common with similar but fully sunk shelters, none appeared to have been structurally damaged by the blast. Exposed woodwork was liable to " flashburn." Internal blast probably threw the occupants about, and gamma rays may have caused casualties.

42. These observations show that the standard British shelters would have performed well against a bomb of the same power exploded at such a height. Anderson shelters, properly erected and covered, would have given protection. Brick or concrete surface shelters with adequate reinforcement would have remained safe from collapse. The Morrison shelter is designed only to protect its occupants from the debris load of a house, and this it would have done. Deep shelters such as the refuge provided by the London Underground would have given complete protection.

LONDON
1946

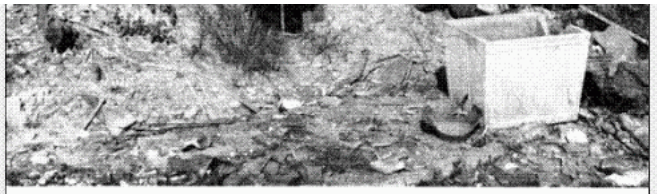
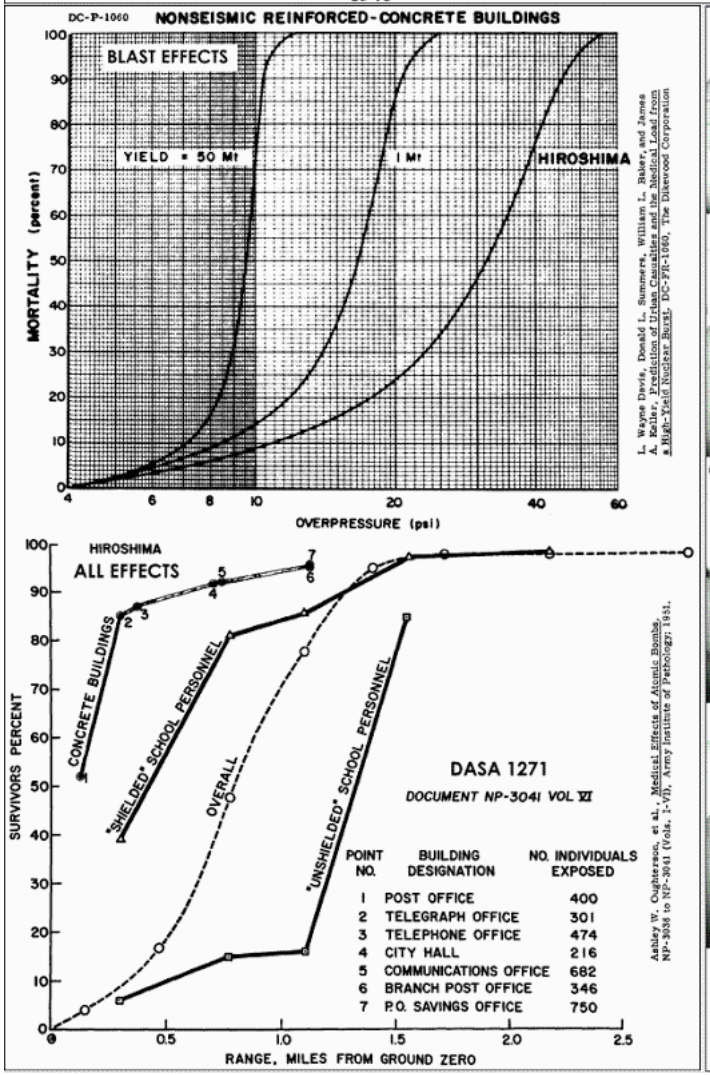
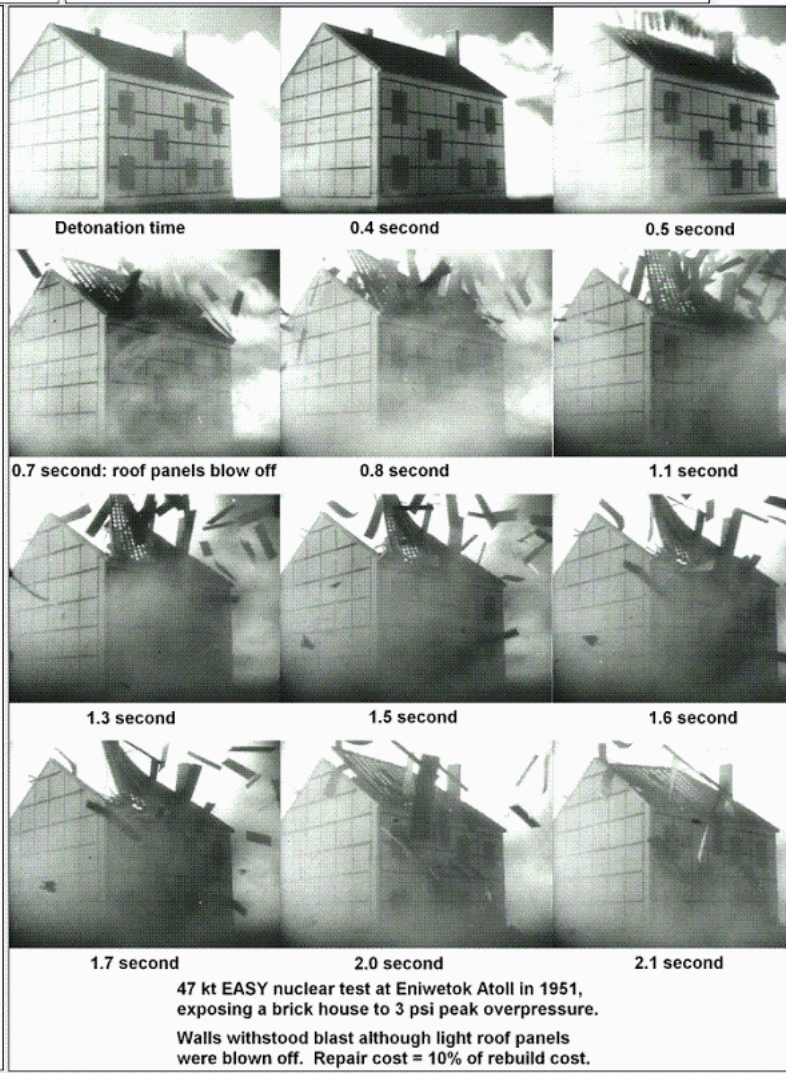


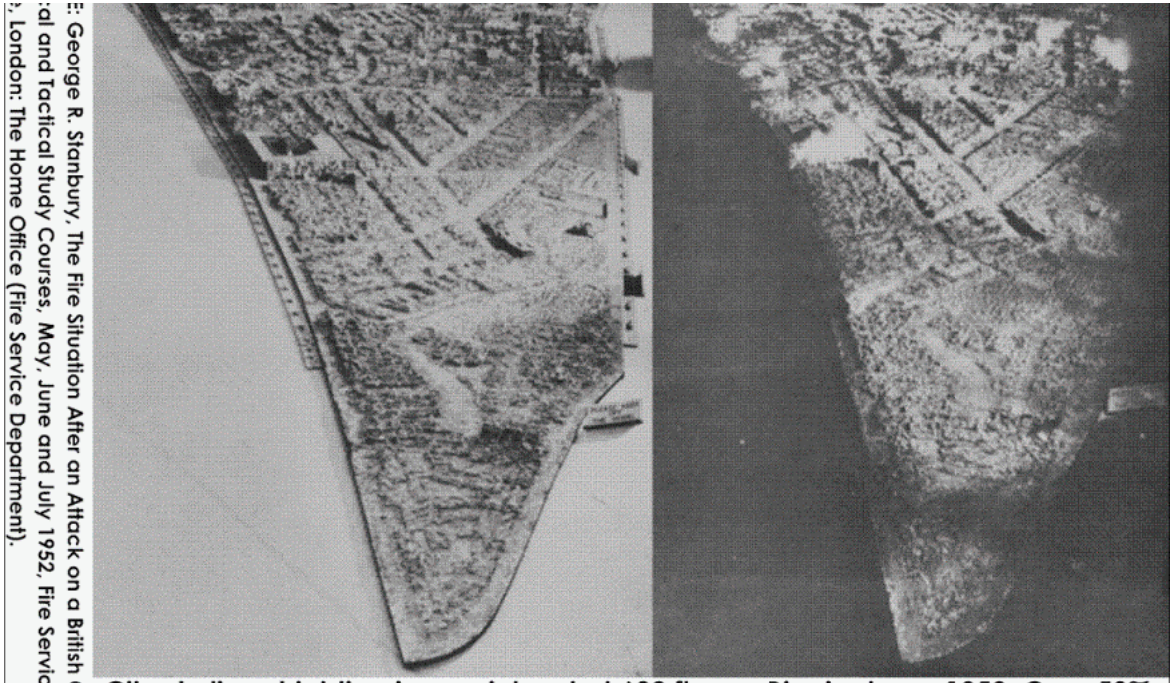
Photo No. 18. NAGASAKI. Typical small earth-covered back yard shelter with crude wooden frame, less than 100 yds. from the centre of damage, which is to the right. There was a large number of such shelters, but whereas nearly all those as close as this one had their roofs forced in, only half were damaged at 300 yds., and practically none at half a mile from the centre of damage.





47 kt EASY nuclear test at Eniwetok Atoll in 1951, exposing a brick house to 3 psi peak overpressure.

Walls withstood blast although light roof panels were blown off. Repair cost = 10% of rebuild cost.



:: George R. Stanbury, The Fire Situation After an Attack on a British City. :al and Tactical Study Courses, May, June and July 1952, Fire Service , London: The Home Office (Fire Service Department).

City skyline shielding in an air burst at 600 ft over Birmingham, 1952. Over 50% of the buildings were shielded, preventing a firestorm (144:1 scale model).

The National Archives
HO 225 /121

HOME OFFICE

CD/SA 121

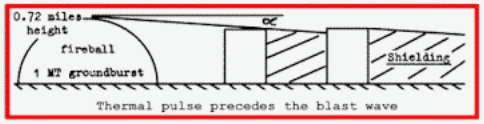
SCIENTIFIC ADVISER'S BRANCH

(Paper at Tripartite Thermal Effects Symposium, Dorking, October 1964)

IGNITION AND FIRE SPREAD IN URBAN AREAS FOLLOWING A NUCLEAR ATTACK

G. R. Stanbury

INITIAL FIRE INCIDENCE



Assuming that buildings on opposite sides of a street which is receiving heat radiation from a direction perpendicular to its length are of the same height we take the average depth of a floor to be 10 ft.

Effect of Shielding: Estimation of the number of exposed floors

Distance from explosion miles	Angle of arrival ∝°	Width of street (units of 10 ft.) 2	3	4	5	6	7	8
3	13½	.5	.5	1	1	1.5	1.5	2
4	10	.5	.5	.5	1	1	1.5	1.5
5	8	.5	.5	.5	.5	1	1	1

SPREAD OF FIRE

From last war experience of mass fire raids in Germany it was concluded that the overall spread factor was about 2; i.e. about twice as many buildings were destroyed by fire as were actually set alight by incendiary bombs

Number of fires started per square mile in the fire-storm raid on Hamburg, 27th/28th July, 1943

102 tons H.E.	48 tons, 4 lb. magnesium	40 tons, 30 lb. gel.
100 fires	27,000 bombs	3,000 bombs
	8,000 on buildings	900 on buildings
	1,600 fires	800 fires

SECONDARY FIRES FROM BLAST DAMAGE IN LONDON

Fire situation from 1,499 fly bombs in the built-up part of the London Region

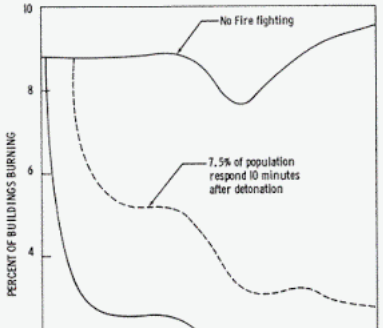
(Fires from 1 ton TNT V1 cruise missiles, 1944)

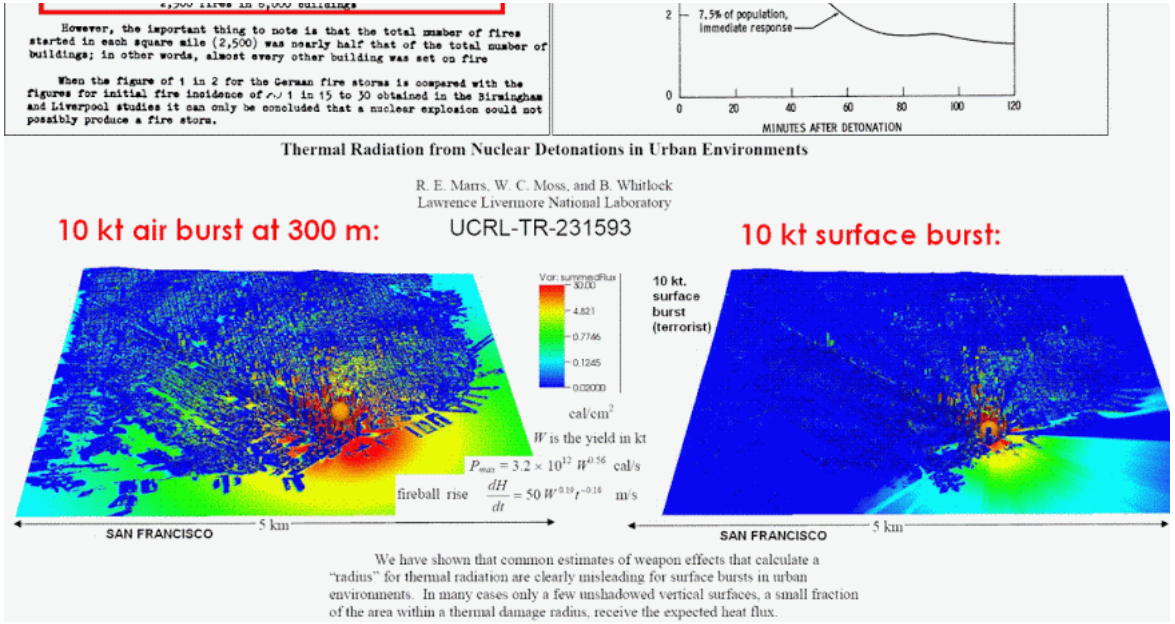
	Number of fly bombs	Fly Bombs Caused: No fire	Small fire	Medium fire	Serious fire	Major fire
Grand Totals	1,499	804	609	75	7	4

The large proportion started no fires at all even in the most heavily built-up areas.

All these fly bombs fell in the summer months of 1944 which were unusually dry. In winter in this country in residential areas there are many open fires which may provide extra sources of ignition. The domestic occupancy is a low fire risk however, and as the proportion of such property in the important City and West End areas is small this should not introduce any serious error. Moreover, in winter, the high atmospheric humidity and the correspondingly high moisture content of timber would tend to retard or even prevent the growth of fire.

Takata, A.N., **Mathematical Modeling of Fire Defenses,** IITRI, March 1970, AD 705 388.





For some of the British nuclear weapons test data debunking American exaggerations of test effects, click **here**.

Britain's first H-bomb, 300 kt radiation imploded Alarm Clock design called Short Granite, seen on 15 May 1957 off Malden Island, from the deck of HMS Warrior (UK National Archives, reference ADM 1/26765). Taylor ins and Li6D in the Alarm Clock, reducing yield.

The Rationale for the United Kingdom Strategic Nuclear Deterrent Force,* DEFE 5/192, Top Secret - UK eyes only, makes it clear in paragraphs 12-13 that Britain's nuclear deterrent is there to prevent *conventional wars, not just nuclear war. For one thing, conventional war with Russia could escalate into nuclear war with Russia, because it has nuclear weapons. Therefore, deterring conventional war is part of the package for deterring nuclear war, if the adversary has nuclear weapons. The more countries have nuclear weapons, the further this deterrence of conventional war must extend, leading to a more peaceful world. Seeing

that even Hitler - who had 12,000 tons of tabun nerve gas ready by 1945 - was prevented from using nerve gas, it is clear that even the craziest dictators *can be restrained from using weapons of mass destruction by deterrence; fear of retaliation.*

TOP SECRET UK EYES ONLY

ANNEX A to DP 11/72(Final)
(Continued)

Damage Infliction -Assessing the Prize

42. The level of effectiveness required, however difficult to establish, is crucial to determining quality and quantity and thus in establishing the cost of whatever system is selected. It is however so far impossible to establish any finite conclusions from the strategic systems which at present exist. We know the United States damage criterion; and we know that the Soviet Union have not undertaken major aggression. We do not know that the latter is a consequence of the former, and we do not know whether, if it is, any lower level of effectiveness would have deterred. The question may be expressed as "how many Soviet cities need to be able to be destroyed to achieve a deterrent effect?", and it is immediately clear that, since the answer essentially derives from assumptions about Soviet psychology it must be highly speculative. Yet much depends on it.

43. United States' calculations of the capability she requires have to be based on the possibility that the Russians might be prepared to run very high risks indeed, and to undergo a level of destruction which other countries would regard as unacceptable if in so doing she was able to eliminate the other nuclear super-power from the next few hundred years of world history; the United States thus feels that she needs to convince Russia beyond all possible doubt that if she attacked the continental United States, she would not survive as a nation to enjoy her "victory".

RETAINED UNDER

SECTION 3(4)

This requires hundreds of weapons.

PAGE A-21, PARA. 61:

TOP SECRET UK EYES ONLY

ANNEX A to DP 11/72(Final)
(Continued)

a. The United States may come to welcome the strengthening of the European policy of the Alliance which a British capability helps to provide. This, however, has to be considered against possible United States' disenchantment with a capability for escalation to the strategic level which she herself cannot control.

UK NATIONAL ARCHIVES, Catalogue Reference:defe 4/266/4
Ministry of Defence, Chiefs of Staff (COS) Defence Policy Staff Report, 20 March 1972, DP 11/72 (Final), THE RATIONALE FOR THE UNITED KINGDOM STRATEGIC NUCLEAR DETERRENT FORCE.

Rationale for UK strategic nuclear deterrent, 1972 top secret report

defe/5/197/8

TOP SECRET UK EYES A

ANNEX A TO
COS 40/73

THE MAINTENANCE OF A UNITED KINGDOM
INDEPENDENT STRATEGIC NUCLEAR CAPABILITY

INTRODUCTION

1. In 1972 a number of inter-related studies on the subject of the United Kingdom's independent strategic nuclear deterrent were completed and a memorandum (1) containing our advice was offered to Her Majesty's Government. Since that advice was offered a number of changes to the circumstances concerning the recommendations have occurred and the Chief of the Defence Staff instructed the Assistant Chief of the Defence Staff (Policy) to re-examine the subject (2).

BACKGROUND

Rationale

3. As part of the studies concerned with the maintenance of

the United Kingdom's independent strategic nuclear force, in April 1972 we restated (3) the case for maintaining a UK strategic nuclear force and reviewed the need to retain an effective nuclear deterrent in the longer term. The conclusions of our paper (3) relevant to this study were as follows:

"The main justification for the possession of a nuclear deterrent is to provide the ultimate guarantee of national security and sovereignty, and to protect national interests where conventional defences are no longer effective. Without it, the United Kingdom has no means of its own of deterring nuclear attack or large-scale conventional aggression by a

Notes:

1. S of S' MO 18/1/1 of 6 November 1972.
2. CDS 1141/5 dated 3 October 1973.
3. COS 45/72 dated 25 April 1972.
4. JIC(A)(72)30.

A - 1

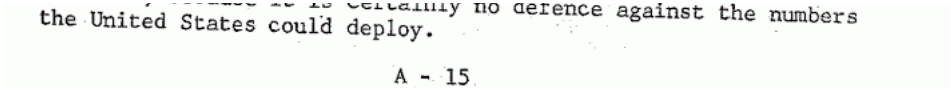
"As to the level of effectiveness required:

a. The force, and its systems of control, must at all times be able to remain effective in the face of pre-emptive attack. The alternative would be to place absolute reliance on the factor of warning time. (para 75).

b. It must be capable of inflicting on Soviet Russia a level of damage which Soviet leaders would regard as unacceptable as the price for an aggression on the United Kingdom or her European allies. This level was defined in 1962 as the equivalent of the destruction of the five largest Russian cities. Although we have no reason to doubt the continuing validity of this criterion, we consider that it would now be timely to obtain comment on certain specific points. (para 75).

A - 2

35. It can be argued, and the JIC take this line, that the Soviet leaders are less likely to be so well-informed as the UK of the technical details of Polaris. Moreover by inclination the Soviets are cautious and would be likely to credit the UK with a greater capability than we actually possess. Nevertheless, if they consider that the UK is not taking steps to improve its strategic weapon system, they may well calculate that their present or prospective ABM defences will suffice to keep out British missiles; indeed, their acceptance of a limit of 100 ABMs in defence of Moscow could be argued as a sign that they consider a defence of this size sufficient to defend their capital against British and French missiles, because it is certainly no de-


the United States could deploy.

A - 15

Maintenance of the UK Independent Strategic Nuclear Capability, UK National Archives document DEFE 5/197. Note that UK definition of assured destruction is detonating warheads over five enemy cities, rather than stopping a military attack by detonating a neutron bomb over a tank column. There are very serious problems with trying to stop a megalomaniac dictator by attacking his civilian cities. First, it does not stop his tanks, ships, or missiles. Second, he may have ABM and civil defense. Third, he may be happy to sit safe in his well protected Führerbunker during the attack, knowing that for an enemy to bomb his cities will strengthen his standing with his own people as a propaganda exercise (this is what occurred in Germany, Vietnam, Iraq, etc.). It is a stronger, more credible deterrent to bomb concentrated enemy tank columns, making them disperse by the threat of the neutron bomb, so that the dispersed force can be taken out with handheld anti-tank rockets and conventional air strikes. The advantage of the neutron bomb, then, is that it is a credible deterrent against conventional dictatorial invasions of the Blitzkrieg sort. It upsets dictatorships.

The British declassified report has deleted sections justified by the comment: ***Retained under section 3(4) of the Public Records Act of 1958***, which is the British equivalent to the use of **sub-section (b)(3) of the title 5 of the U.S. Code, Section 552**, which defines matters exempt from disclosure in America, presumably because of the continuing secrecy concerning what target damage to enemies is judged to be adequate deterrence. How that secrecy of the details of the deterrent threat is supposed to be compatible with a credible deterrent to a potential adversary is not explained, but judging by President Putin's invasion of Ukraine last year despite the Budapest Memorandum guaranteeing Ukraine's security by the UK and USA, it is clear that it's not a very strong deterrent. If the basis of the UK's deterrence is causing relatively minor destruction to soft civilian targets (in 1962 Britain in secret defined effective deterrence as the credible ability to detonate nuclear weapons over five enemy cities), rather than debunking hard targets under the Kremlin or at least military bases, tank depots, etc., *it is not adequate to deter a Vietcong style megalomaniac (who does not mind losing windows in five cities); we need tactical nuclear deterrence for military targets*.

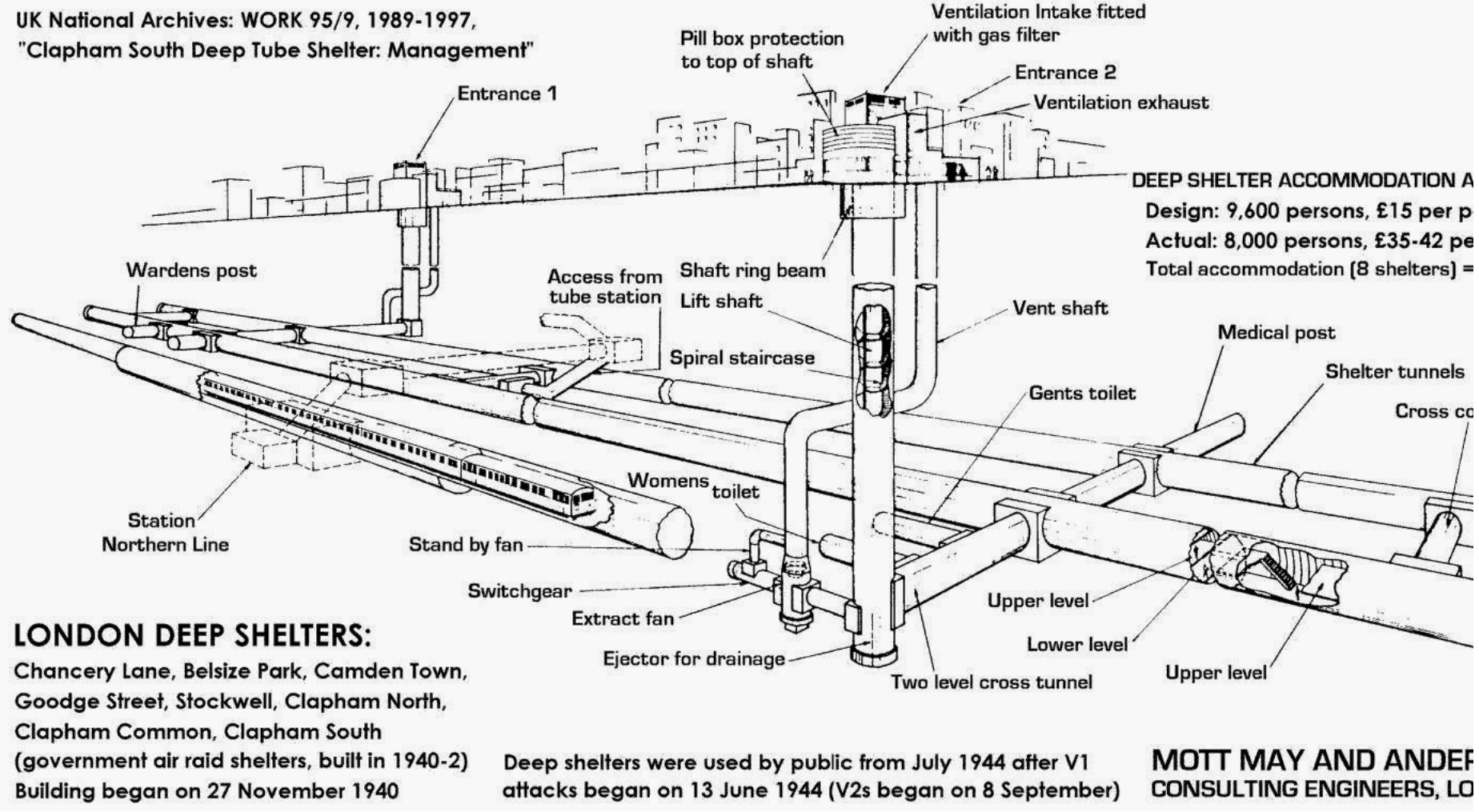
The best deterrent, judging from the opposition to it generated by the USSR during the Cold War, is the neutron bomb. If you deter massed invasions and troop or tank concentrations by the neutron bomb, then you force the enemy to disperse and that in itself prevents Blitzkrieg. It completely destroys the credibility of their plans for invasions, thus making the world safer.

According to Figures 6.41a and 3.94a in Glasstone's 1957 *Effects of Nuclear Weapons,* it takes a peak overpressure of *70 psi to demolish (i.e. severe or type A damage) a British WWII type reinforced concrete surface shelter, regardless of bomb yield*. According to Figures 6.41b and 3.94a in the same book, it takes a peak overpressure of *50 psi for 1 kiloton (terrorist or neutron bomb) yield or 15 psi for 1 megaton yield to collapse a typical modern city-type multistory reinforced concrete frame building with light walls*. These figures are justified by the survival of multistory concrete buildings with typical *large window areas*, near ground zero in Hiroshima and Nagasaki.

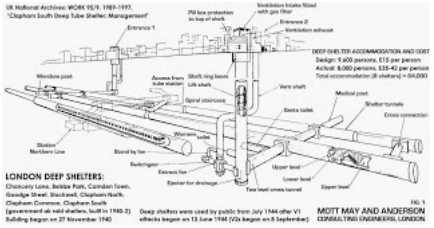
But when you look at chapter 11, *Damage to Structures,* in the declassified 1972 Secret American effects manual EM1, *Capabilities of Nuclear Weapons* (which is the basis for the 1977 edition of Glasstone and Dolan's Effects of Nuclear Weapons), severe damage to reinforced concrete building (building type 11-3) is predicted at *only 17 psi peak overpressure for 1 kt, and 11 psi for 1 megaton* (above 1 megaton, peak overpressures are independent of the yield: a wall isn't pushed over regardless of the impulse or how long you push for, if the peak overpressure is too low to cause it to crack). It turns out that the difference is due to the fact that the 1972 EM1 book absurdly assumes *small window areas*, which is defined by Glasstone as 5% window area, which maximises the loading on the building. In reality, *modern city concrete buildings tend to have much larger areas of glass* which breaks easily, reducing the blast loading.

In the earlier 1962 edition of the *Capabilities of Nuclear Weapons* (then designated TM 23-200, and just renamed from *Capabilities of Atomic Weapons*), reinforced concrete buildings are severely damaged at a peak overpressure of 24.5 psi for 10 kt and 14 psi for 1 Mt. The November 1957 edition of *Capabilities of Atomic Weapons,* Figure 7-20 shows that simple US Army field command posts with 4 feet of earth cover require a peak overpressure of 80 psi for fail, for surface bursts; Figure 7-22 shows that simple unrevetted open foxholes and trenches (similar to the standard protection against shelling in the American Civil War, in WWII and in England during the 1938 Munich crisis) in the dry soil of Nevada resists 20 psi.

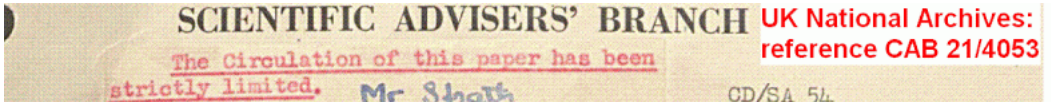
The shameful thing is that the application of such effective, simple, cheap field-tested countermeasure effectiveness data remained secret for so long, and remains obscured from discussions of nuclear weapons. Modern concrete city buildings and simple trenches for rural areas offer immense, low cost protection:



Add caption



Add caption



SECRET It is issued for the personal use of ..... Copy No. 54

Some Aspects of Shelter and Evacuation Policy
to meet H-Bomb threat

2 Method of Estimating Deaths

The deaths from a nominal atomic bomb among a population of standard density (43.56 per acre) all in houses have been estimated (CDJPS(EA)(48)14 (Revised)) as 31,000. This is equivalent to everyone within 0.6 miles of the bomb being killed and no one being killed outside this radius. If the generally accepted scaling laws for blast heat and gamma radiation are assumed to apply to hydrogen bombs, then it will be sufficiently accurate for present purposes if we assume that for them everyone is killed within a radius of $0.6\sqrt[3]{F}$ and no one is killed outside this radius. (Where F is the lower factor of the bomb expressed as a multiple of the lower of the nominal bomb). This assumption ignores the possibility that under certain circumstances there could be a large number of additional casualties due to fall out or radio-active crater debris.

From this and from the known night-time population distribution of our major cities (CD/SA 33), it is a simple matter to calculate the deaths from a bomb of any power on the centre of any particular city.

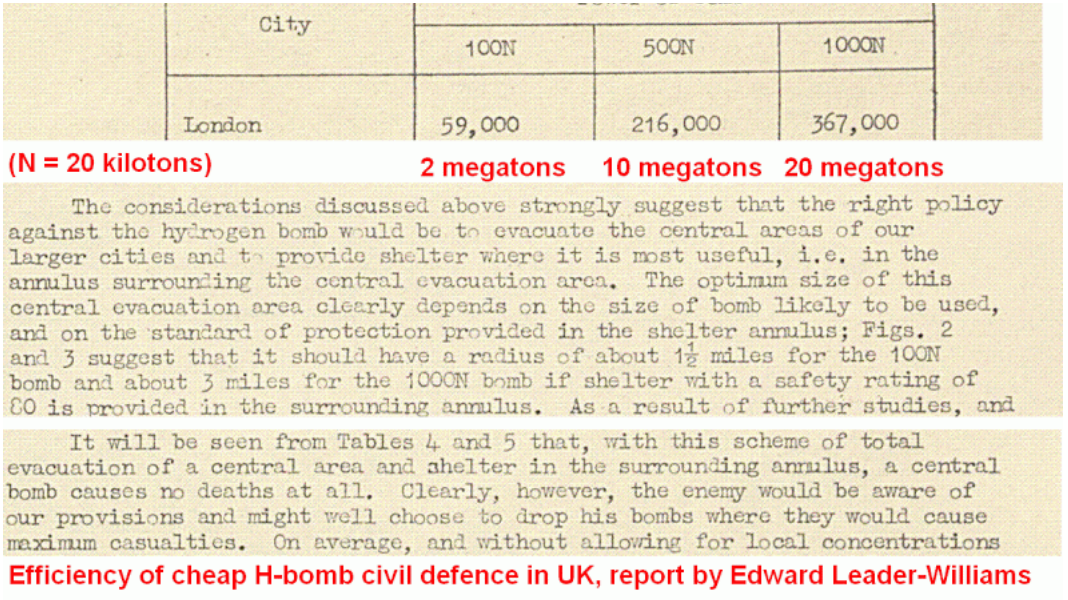
by means of the "Safety Rating" concept developed in CD/SA 48. The safety rating of a shelter was there defined as the saving in life, expressed as a percentage of the deaths without shelter, resulting from the use of the shelter in an area of uniform population density. This shelter with a safety rating of 80 would save 80% of the lives that would have been lost if everyone had been in a house. Put in another way, shelter with a safety rating of 80 would reduce the area within which deaths occurred to one fifth of that for people in houses, and therefore the radius of death to $\frac{1}{\sqrt{5}}$. For a bomb with a power factor of F the equivalent radius of death if everyone is in a shelter with a safety rating of 80 will therefore be $\frac{0.6\sqrt[3]{F}}{\sqrt{5}}$. Similarly for shelter with a safety rating of 90 the radius will be $\frac{0.6\sqrt[3]{F}}{\sqrt{10}}$.

Although, as stated above, the design details of shelters to give these safety ratings have not been determined, it seems probable that surface or trench shelters of rather less than Grade A strength (say 1000 lb/sq.ft.) would be required to give a safety rating of 80, and that a strength of about 2000 lb/sq.ft. would be required for a safety rating of 90. For small street surface shelters the extra cost of an increase in strength of this sort is very small (e.g. the structural cost of a 12"/1000 lb/sq.ft. design is given in CD/SA 48 as £15.2 per person, based on seated capacity) and of a 12"/1400 lb/sq.f design as £15.5 per person) and detailed studies may well show that shelters with a higher safety rating than 90 are a practical proposition.

Table 3

Deaths with no evacuation but with everyone
in a shelter with a Safety Rating of 90

	Power of bomb



City	100N	500N	1000N
London	59,000	216,000	367,000

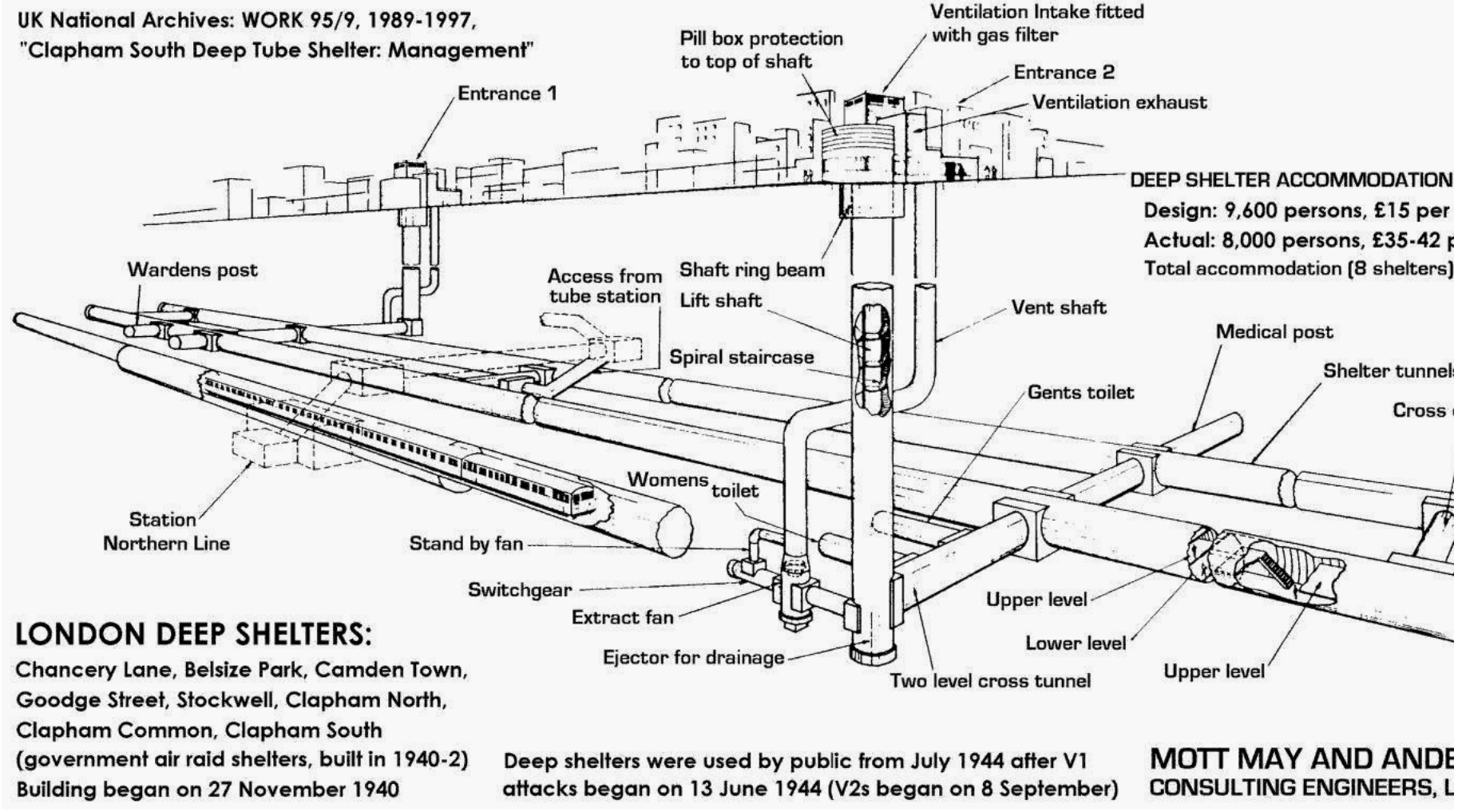
(N = 20 kilotons) 2 megatons 10 megatons 20 megatons

The considerations discussed above strongly suggest that the right policy against the hydrogen bomb would be to evacuate the central areas of our larger cities and to provide shelter where it is most useful, i.e. in the annulus surrounding the central evacuation area. The optimum size of this central evacuation area clearly depends on the size of bomb likely to be used, and on the standard of protection provided in the shelter annulus; Figs. 2 and 3 suggest that it should have a radius of about 1½ miles for the 100N bomb and about 3 miles for the 1000N bomb if shelter with a safety rating of 80 is provided in the surrounding annulus. As a result of further studies, and

It will be seen from Tables 4 and 5 that, with this scheme of total evacuation of a central area and shelter in the surrounding annulus, a central bomb causes no deaths at all. Clearly, however, the enemy would be aware of our provisions and might well choose to drop his bombs where they would cause maximum casualties. On average, and without allowing for local concentrations

Efficiency of cheap H-bomb civil defence in UK, report by Edward Leader-Williams

Secret classified report by British H-bomb casualty expert Edward Leader-Williams, National Archives document CAB 21/4053, proving that cheap civil defence shelters even without any evacuation of the central area can reduce casualties from a 2 megaton H-b to 59,000 people, and a combination of evacuating the central area plus shelter for people on the outskirts can reduce casualties to absolutely zero! Of course, the enemy could try to re-target the missiles on shelters, but there is still an immense saving of life and incentive for an enemy attack. The cost is far cheaper in both lives and in the effect on our trillion-plus national debt, to deal with nuclear proliferation risks, than launching a preventative war abroad. We could have built proper civil defence for all our cities at a immense foreign wars of the last 15 years, and the shelters could double up as peacetime emergency accommodation to deal with the immigration of war refugees. But scare-mongering by CND (of which Prime Minister Tony Blair was a former member) who atta defence option and their lying exaggerations of WMD threats ensured that as many people were killed as could be by spending money on offensive actions leading today to IS, and that the objective choices were not made by politicians. By making civil defens deterrence becomes incredible and appeasement is followed by war.



Above: London's eight large **WWII 16.5 ft internal diameter tube shelters** were tested and found to offer **excellent blast and radiation protection**. Their cost is dirt cheap compared to preventative wars like Iraq, 2003. Although, as proved at **Nagasaki**, these s useless in a surprise attack if normally unoccupied, they are useful if they are used as normal accommodation for central city workers in a period of international crisis (as in **WWII blitz**). Furthermore, in peace time they could be used to offer emergency accomm flood of war refugees and EU immigrants who are causing a massive housing crisis in London. At a cost of £35-£42 per person in WWII, even allowing for inflation, this is cheap accommodation compared to traditional London housing today. In addition, **civil in the UK would produce large rescue teams for emergency use like flooding**, overseas earthquake damage rescue, etc. Harold Wilson only abolished the Civil Defence Corps in 1968 because of pressure from extremists who supported Marxism and wanted to Brezhnev, and also to save a paltry sum of money for squandering on steel industry nationalization, subsidies, etc.

INDUSTRIAL PREPAREDNESS AND NUCLEAR WAR SURVIVAL

WEDNESDAY, NOVEMBER 17, 1976

U.S. CONGRESS,
JOINT COMMITTEE ON DEFENSE PRODUCTION,
Washington, D.C.

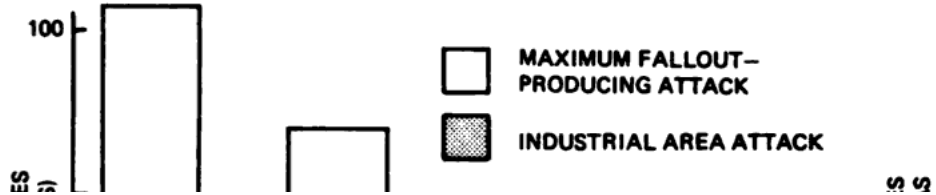
MR. THOMAS K. JONES

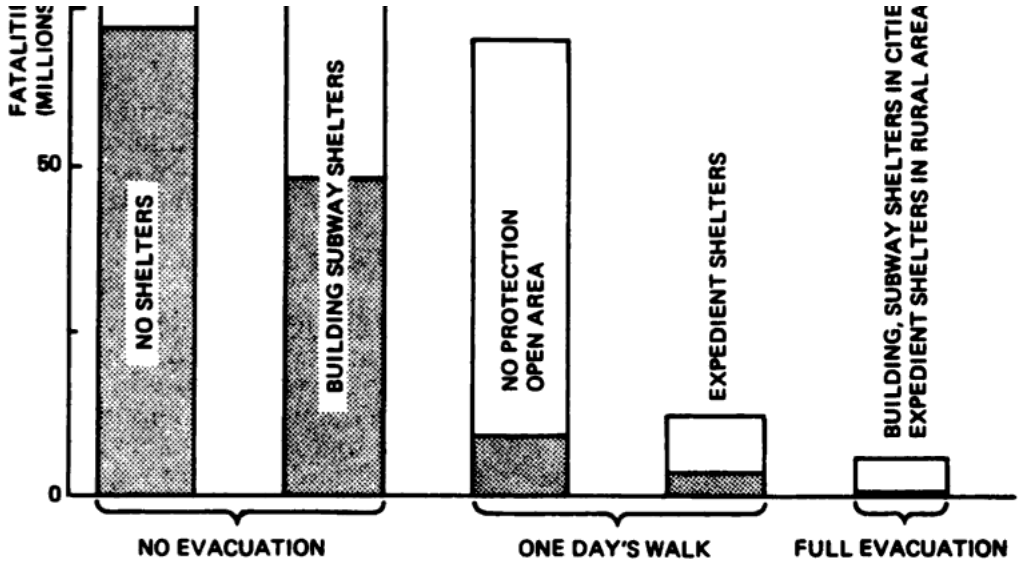
Mr. Jones is the Program and Product Evaluation Manager for the Boeing Aerospace Company. In this capacity he directs analyses and studies of national requirements, evaluates the capabilities of present and potential product lines to satisfy national requirements, and determines the allocation of research budgets to product programs.

From June 1971 thru August 1974, Mr. Jones was employed by the Office of the Secretary of Defense (DDR&E) in support of the Strategic Arms Limitations Talks (SALT). In this assignment, he served as Deputy Director, OSD SALT support group and as Senior Adviser to the OSD member of the U.S. SALT delegation. Through his appointment as a consultant to the Defense Science Board, he is continuing to support the SALT activities.

From 1954 until his employment by the Department of Defense, Mr. Jones was employed by Boeing in a number of design engineering, system engineering, and management assignments. These assignments included work on options to extend the viability of the Minuteman ICBM system, study of strategic tanker systems, analysis of ABM systems, system engineering of manned space systems, and design of strategic bomber systems.

STATEMENT OF MR. THOMAS K. JONES





Soviet population fatalities (surviving U.S. Strategic Forces).

The Russians have themselves demonstrated that industrial buildings are not essential to continued production. To protect their aviation industry from German bomber attacks, the Soviets in 1941 used railroad cars to relocate approximately 1,523 industrial enterprises, including 1,360 large war plants, to the Trans-Volga, Urals, Eastern Siberia, and to Kazakhstan and Central Asia. This relocation involved 85% of the entire aviation industry. At many sites, resumption of production began even before temporary facilities were constructed. Machines were set up on temporary platforms in the open, and work was accomplished in weather that reached -40 degrees. Within a year, production rates exceeded the highest rates that had been achieved prior to the relocation.[7]

follows. Given a first strike by the USSR, the U.S. would have on the order of half of its nuclear arsenal (ICBMs, SLBMs, and bombers) surviving. If these weapons were programmed to achieve maximum destruction of industrial targets, the entire U.S. surviving inventory could destroy unprotected people in, at most, 3% of Soviet territory. If the people were protected by simple, foxhole-type shelters, the lethal area that could be imposed by the U.S. surviving arsenal would be reduced to one-third of 1% of the Soviet land mass.†

SECRET – RESTRICTED DATA classification of cheap civil defense effectiveness data:

Dolan's EM-1 (1972) "Capabilities of Nuclear Weapons" states that a peak overpressure of 22 psi is needed for severe damage to simple unrevetted foxholes or trenches in dry consolidated Nevada sand and gravel.

Severe damage is defined as 50% filling with blasted sand. In damp soil even higher pressures are needed!

†The calculations from which these figures are extracted have been furnished to the Committee at a higher classification.

Above: Thomas K. Jones' testimony on 17 November 1976 to the Joint Committee on Defense Production, U.S. Congress, Industrial Preparedness and Nuclear War Survival", is the first disclosure of cheap civil defense! There was a problem of secrecy denial with civil defense nuclear test data being applicable to troops also!

CIC-1/99-0680 UNCLASSIFIED Drivers

Secretary of Defense Richard B. Cheney, November 12, 1991 remarks to the San Diego Union editorial board

" Unfortunately, if you look at the historic record, we have never, ever gone through one of these periods and gotten it right. We've always screwed it up. Every single time when it's happened previously we've been so quick to cash in the peace dividend, to demobilize that force, that within a very short period of time we find that our weakness in and of itself becomes provocative and tempts others to do things they shouldn't attempt; that we always end up having, once again, to commit the force some place – we get in trouble in the world and have to send in troops; that we find ourselves with troops that are not well trained or well equipped, not prepared to go to war."

Nuclear Weapons Program
March 1999
UNCLASSIFIED
Los Alamos NATIONAL LABORATORY
17

LA-12063-MS

This document consists of 74 pages

No. 11 of 90 copies, Series A

Nuclear Weapon Data
Sigma 3

~~SECRET~~ SAC20050721 0000 DOCUMENT#

The Future of Non-Strategic Nuclear Forces

Are These Capabilities Still Needed? (U)

Joseph S. Howard II
Edward I. Whitted

April 30, 1991

[Reagan put neutron bomb W79-1 in Europe after Russia invaded Afghanistan, and the Warsaw Pact was deterred, but W79-1 was dismantled in 1992, before US & UK signed a 1994 Chamberlain-type "Budapest Memorandum" to guarantee the security of Ukraine if it gave up nuclear arms.]

[Strategic weapons like W76 deter use of nuclear weapons; tactical W79-1 nuclear weapons deter conventional war]

[Because conventional war with a nuclear power risks escalation to nuclear war, we must deter conventional war, not just nuclear war.]

LA-12063-MS ~~SECRET~~ April 30, 1991

But Future Regional Threats dictate three NSNF

Deterrent Rationales broader than European stability forces

War prevention and war termination where US vital interests are involved:

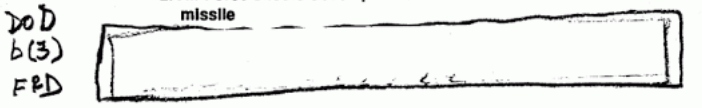
2. A visible symbol of national power in an uncertain & unpredictable multipolar world
3. A deterrent to future non-superpower nuclear-capable adversaries in a proliferated world
4. A deterrent to regional Soviet or Russian aggression as long as resurgence or reconstitution remains feasible.

LA-12063-MS [redacted] April 30, 1991

Recommendations

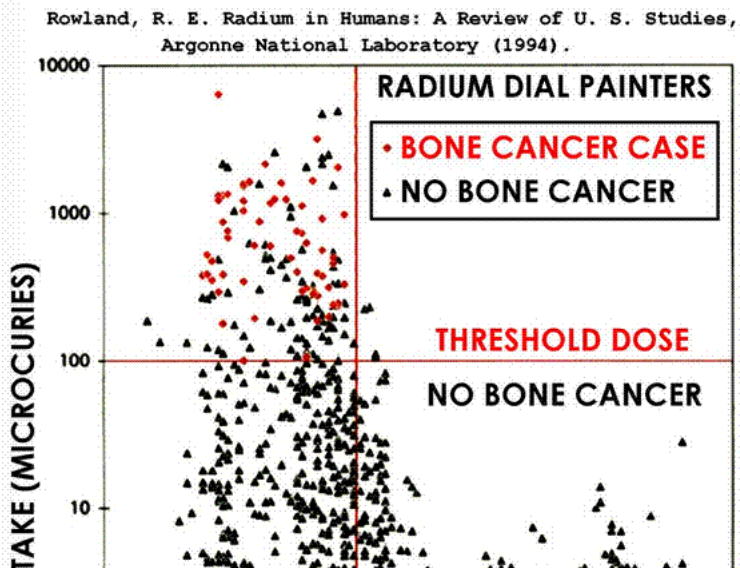
1. Army should keep an organic capability
   - Maintain the W79 and 8-inch delivery as an interim system
   - At the appropriate time (suggest two years) initiate a study to
     - Formally assess future Strategic Army battlefield nuclear missions
     - Examine organic Army force structure alternatives
     - Define technical options for future nuclear systems
2. Air Force should develop a theater air-delivered stand-off missile

DoD b(3) FRD

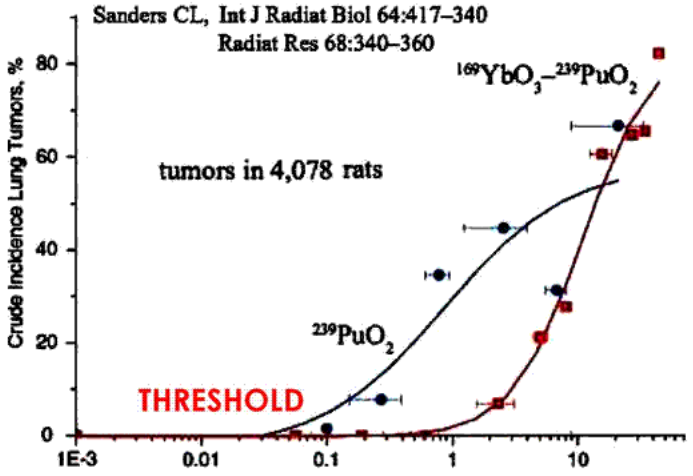


We make the above three recommendations based upon the essential findings of this study.

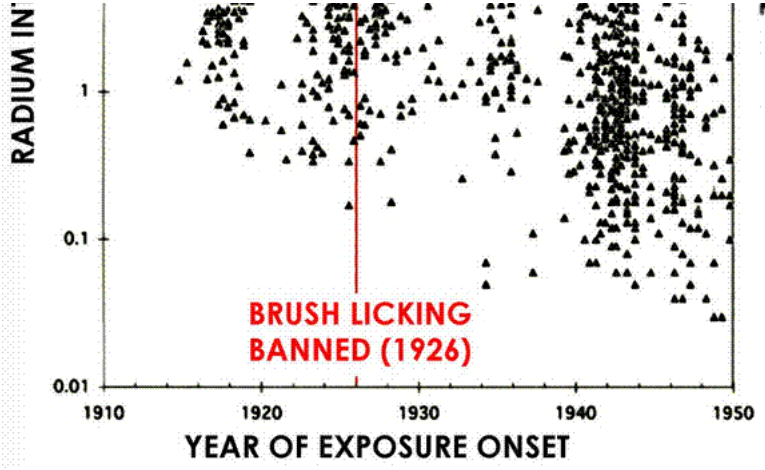
[This secret report was ignored, and the W79 neutron bomb was disarmed.]

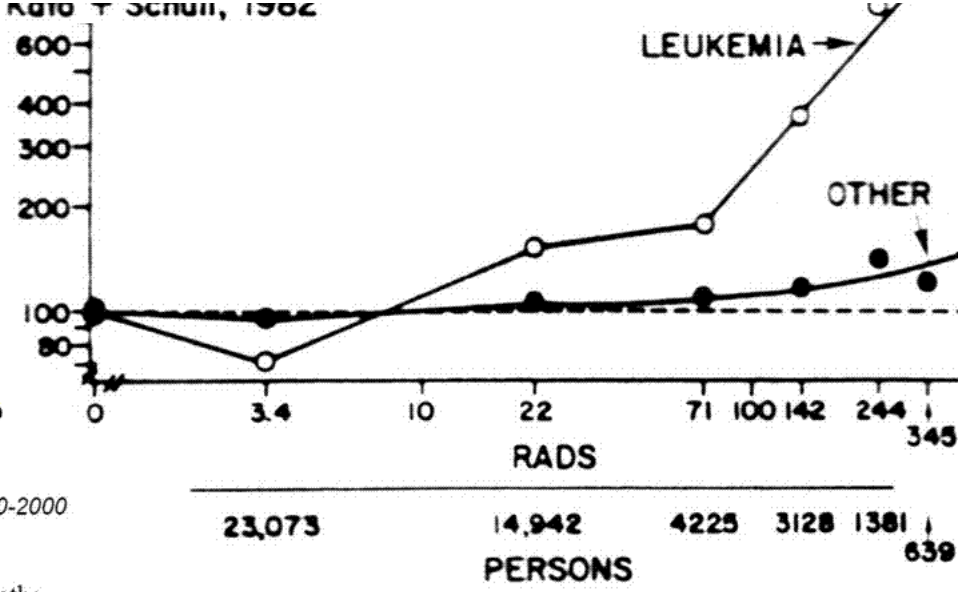


P53 causes the threshold. Radiation unbinds the MDM2 inhibitor from P53, allowing apoptosis and DNA repair to occur.



1950-78 CANCER MORTALITY IN HIROSHIMA-NAGASAKI





Cancer deaths among 86611 Hiroshima and Nagasaki survivors, 1950-2000

Preston, D. L., Radiat. Res. v162, pp377–389 (2004).

Dose range milli-sievert	Cancer deaths (excl. leukaemia)		Leukaemia deaths	
	total rate	rate from radiation	total rate	radiation
Less than 100	11.2%	0.09%	0.2%	0.01%
100 to 200	12.3%	0.7%	0.2%	-0.01%
200 to 1000	13.2%	1.9%	0.6%	0.3%
More than 1000	24.1%	8.1%	3.5%	2.4%
All	**11.7%**	**0.6%**	**0.3%**	**0.1%**

Left: in 1950-2000, for 86,611 Hiroshima and Nagasaki survivors there were a total of 480 solid cancer deaths and 93 leukemias caused by radiation, trivial compared to the larger natural risk!

The radiation scare-mongering fanatics ignore the fact that nearly all the cancers in Hiroshima and Nagasaki were natural as proved by the incidence in unexposed groups. They simply lie that all cancers are due to radiation. This is a deliberate piece of misinformation, and the media aid spreading anti-nuclear propaganda.

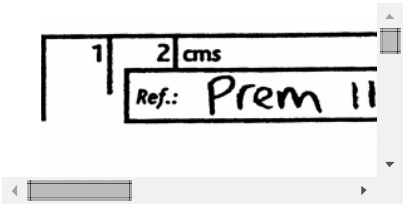
posted by Nuclear Weapons Effects 12:18 a.m.

0 COMMENTS:

Post a Comment

<< Home

CONVENTIONAL WARS HAVE KILLED TENS OF MILLIONS OF PEOPLE, NUCLEAR WEAPONS CAN RAPIDLY DETER THIS REAL THREAT TO PEACE WITH MINIMAL CASUALTIES. 'During the critical period 8-15 February [1968], the U.S. command realized [that conventional] bombing was not sufficiently effective. ... The air campaign dropped over 110,000 tons of bombs and napalm on the area around Khe Sanh during the 77-day siege ... the most heavily bombed target in the history of conventional warfare.' – W. C. Yengst, S. J. Lukasik, and M. A. Jensen, *Nuclear Weapons that went to War,* SAID report DSWA-TR-97-25, September 1998 (quoted in the 2015 book by the secret *Capabilities of Nuclear Weapons* editor, Dr Harold L. Brode, *Nuclear Weapons in the Cold War,* page 287). British Nuclear Test Civil Defence Research



- Share
- Embed

- 1 of 124

CHANGE 1

Field Manual No 101-31-1

NUCLEAR WEAPONS EMPLOYMENT DOCTRINE AND PROCEDURES

Radius of vulnerability (emergency risk criterion: 5% combat ineffective

Figure 54. Radii of Vulnerability.

CATEGORY	PERSONNEL (LL) IN— (Based on Governing Effect)				
	Radii listed are distances at which a 5 percent incidence of effect occurs. HOB used is $60W^{1/3}$ meters.				
Yield (KT)	Open	Open Foxholes	APCs	Tanks	Earth Shelter
	(Distances are in meters)				
0.1	700	600	600	500	300
1	1200	900	900	800	500
10	3200	1300	1300	1250	900
20	4000	1500	1450	1400	1000
100	8000	1900	1800	1800	1400
200	12000	2000	1900	1900	1500
300	14000	2100	1950	1950	1600

Protective factor = ratio of area of effect in the open, area of effect for shelter

Example: for 300 kt, the protective factor of open foxholes is equal to $(14{,}000)^2/(2{,}100)^2 = 44$.

Open	Open Foxholes	APCs	Tanks	Earth Shelter
1	1.36	1.36	1.96	5.44
1	1.78	1.78	2.25	5.76
1	6.06	6.06	6.55	12.6
1	7.11	7.61	8.16	16.0
1	17.7	19.8	19.8	32.7
1	36.0	39.9	39.9	64.0
1	44.4	51.5	51.5	76.6

Calculation of the injury-averting protective factors by simple open foxholes and earth shelter function of weapon yield. Most countermeasures are relatively ineffective against tactical nu wapons (due to the predominating neutron radiation effect at 0.1 kt yield), but are extremely against strategic nuclear weapons with yields of 100, 200 and 300 kt (protective factors of 44 t

The definition of protective factor used here is the factor by which casualties numbers are redu

Richard P. Feynman, 'This Unscientific Age', in *The Meaning of It All*, Penguin Books, London, 1998, pages 106-9:

'Now, I say if a man is absolutely honest and wants to protect the populace from the effects of radioactivity, which is what our scientific friends often say they are trying to do, then he should work on the biggest number, not on the smallest number, and he should try to point out that the [natural cosmic] radioactivity which is absorbed by living in the city of Denver is so much more serious [than the smaller doses from nuclear explosions] ... that all the people of Denver ought to move to lower altitudes.'

"If a man reads or hears a criticism of anything in which he has an interest, watch ... if he shows concern with any question except 'is it true?' he thereby reveals that his own attitude is unscientific. Likewise if ... he judges an idea not on its merits but with reference to the author of it; if he criticizes it as 'heresy'; if he argues that authority must be right because it is authority ... The path of truth is paved with critical doubt, and lighted by the spirit of objective enquiry... the majority of people have resented what seems in retrospect to have been purely matter of fact ... nothing has aided the persistence of falsehood, and the evils resulting from it, more than the unwillingness of good people to admit the truth ... the tendency continues to be shocked by natural comment, and to hold certain things

too 'sacred' to think about. ... How rarely does one meet anyone whose first reaction to anything is to ask: 'is it true?' Yet, unless that is a man's natural reaction, it shows that truth is not uppermost in his mind, and unless it is, true progress is unlikely."

- Sir Basil Henry Liddell Hart, *Why Don't We Learn from History?,* PEN Books, 1944; revised edition, Allen and Unwin, 1972.

Civil defense countermeasures, to be taken seriously by the population, require the publication of solid facts with the scientific evidence to support those facts against political propaganda to the contrary. Secrecy over the effects of nuclear weapons tests does not hinder plutonium and missile production by rogue states, but it does hinder civil defense countermeasures, by permitting lying political propaganda to go unopposed (see linked post, here).

Terrorists successfully prey on the vulnerable. The political spreading of lies concerning threats and the alleged 'impossibility' of all countermeasures, terrorizing the population in order to 'justify' supposedly pro-peace disarmament policies in the 1920s-1930s, resulted in the secret rearmament of fascist states which were terrorizing the Jews and others, eventually leading to World War II.

Political exaggerations about nuclear weapons effects today:

(1) encourage terrorist states and other groups to secretly invest in such weapons to use either for political intimidation or for future use against countries which have no countermeasures, and

(2) falsely dismiss, in the eyes of the media and the public, cheap relatively effective countermeasures like civil defense and ABM.

Therefore, doom-mongering media lies *make us vulnerable to the proliferation threat* today in two ways, just as they led to both world wars:

(1) Exaggerations of offensive technology and a down-playing of simple countermeasures such as trenches, encouraged belligerent states to start World War I in the false belief that modern technology implied overwhelming firepower which would terminate the war quickly on the basis of offensive preparedness: if the facts about simple trench countermeasures against shelling and machine guns during the American Civil War had been properly understood, it would have been recognised by Germany that a long war based on munitions production and logistics would be necessary, and war would have been seen to be likely to lead to German defeat against countries with larger overseas allies and colonies that could supply munitions and the other resources required to win a long war.

(2) Exaggerations of aerial bombardment technology after World War I led to disarmament 'supported by' false claims that it was impossible to have any defense against a perceived threat of instant annihilation from thousands of aircraft carrying gas and incendiary bombs, encouraging fascists to secretly rearm in order to successfully take advantage of the fear and vulnerability caused by this lying political disarmament propaganda.

Contrived dismissal of civil defense by Marxist "Cambridge Scientists Anti-War Group" bigots: (a) appeased war-mongering enemies, and (b) maximised war mortality rates. Idealism kills. Super effective, fully proof-tested, cheap civil defense makes nuclear deterrence credible to stop conventional war devastation by avoiding collateral damage, tit-for-tat retaliation and escalation.

Historically, it has been proved that having weapons is not enough to guarantee a reasonable measure of safety from terrorism and rogue states; countermeasures are also needed, both to make any deterrent credible and to negate or at least mitigate the effects of a terrorist attack. Some people who wear seatbelts die in car crashes; some people who are taken to hospital in ambulances, even in peace-time, die. Sometimes, lifebelts and lifeboats cannot save lives at sea. This lack of a 100% success rate in saving lives doesn't disprove the value of everyday precautions or of hospitals and medicine. Hospitals don't lull motorists into a false sense of security, causing them to drive faster and cause more accidents. Like-minded 'arguments' against ABM and civil defense are similarly vacuous.

'As long as the threat from Iran persists, we will go forward with a missile system that is cost-effective and proven. If the Iranian threat is eliminated, we will have a stronger basis for security, and the driving force for missile-defense construction in Europe will be removed.'

- President Obama, Prague Castle, Czech Republic, 4 April 2009.

Before 9/11, Caspar Weinberger was quizzed by skeptical critics on the BBC News program *Talking Point, Friday, May 4, 2001: Caspar Weinberger quizzed on new US Star Wars ABM plans:*

'The [ABM] treaty was in 1972 ... The theory ... supporting the ABM treaty [which prohibits ABM, thus making nations vulnerable to terrorism] ... that it will prevent an arms race ... is perfect nonsense because we have had an arms race all the time we have had the ABM treaty, and we have seen the greatest increase in proliferation of nuclear weapons that we have ever had. ... So the ABM treaty preventing an arms race is total nonsense. ...

'You have to understand that without any defences whatever you are very vulnerable. **It is like saying we don't like chemical warfare - we don't like gas attacks - so we are going to give up and promise not to have any defences ever against them and that of course would mean then we are perfectly safe. ...**

'The Patriot was not a failure in the Gulf War - the Patriot was one of the things which defeated the Scud and in effect helped us win the Gulf War. One or two of the shots went astray but that is true of every weapon system that has ever been invented. ...

'The fact that a missile defence system wouldn't necessarily block a suitcase bomb is certainly not an argument for not proceeding with a missile defence when a missile that hits can wipe out hundreds of thousands of lives in a second. ...

'The **curious thing about it is that missile defence is not an offensive weapon system - missile defence cannot kill anybody. Missile defence can help preserve and protect your people and our allies, and the idea that you are somehow endangering people by having a defence strikes me almost as absurd as saying you endanger people by having a gas mask in a gas attack.** ...

'President Bush said that we were going ahead with the defensive system but we would make sure that nobody felt we had offensive intentions because we would accompany it by a unilateral reduction of our nuclear arsenal. It seems to me to be a rather clear statement that proceeding with the missile defence system would mean fewer arms of this kind.

'You have had your arms race all the time that the ABM treaty was in effect and now you have an enormous accumulation and increase of nuclear weapons and that was your arms race promoted by the ABM treaty. Now if you abolish the ABM treaty you are not going to get another arms race - *you have got the arms already there* - and if you accompany the missile defence construction with the unilateral reduction of our own nuclear arsenal then it seems to me you are finally getting some kind of inducement to reduce these weapons.'

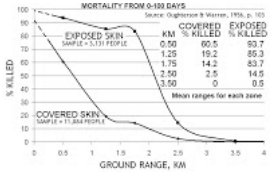
Before the ABM system is in place, and afterwards if ABM fails to be 100% effective in an attack, or is bypassed by terrorists using a bomb in a suitcase or in a ship, civil defense is required and can be effective at saving lives:

'Paradoxically, the more damaging the effect, that is the farther out its lethality stretches, the more can be done about it, because in the last fall of its power it covers vast areas, where small mitigations will save very large numbers of people.'

- Peter Laurie, *Beneath the City Streets: A Private Inquiry into the Nuclear Preoccupations of Government,* Penguin, 1974.

'The purpose of a book is to save people [the] time and effort of digging things out for themselves. ... we have tried to leave the reader with something tangible – what a certain number of calories, roentgens, etc., means in terms of an effect on the human being. ... we must think of the people we are writing for.'

– Dr **Samuel Glasstone**, DSc, **letter dated 1 February 1957 to Colonel Dent L. Lay, Chief, Weapons Effects Division, U.S. Armed Forces Special Weapons Project, Washington, D.C., pages 2 and 4, concerning the preparation of *The Effects of Nuclear Weapons*.**



Glasstone and Dolan stated in *The Effects of Nuclear Weapons* (1977), Table 12.17 on page 546, that the median distance in Hiroshima

for survival after 20 days was 0.12 miles for people in concrete buildings and 1.3 miles for people standing outdoors. Therefore the median distances for survival in modern city buildings and in the open differed by a factor of 11 for Hiroshima; the difference in areas was thus a factor of 11^2 or about 120. *Hence, taking cover in modern city buildings reduces the casualty rates and the risks of being killed by a factor of 120 for Hiroshima conditions, contrary to popular media presented political propaganda that civil defence is hopeless*. This would reduce 120,000 casualties to 1,000 casualties.

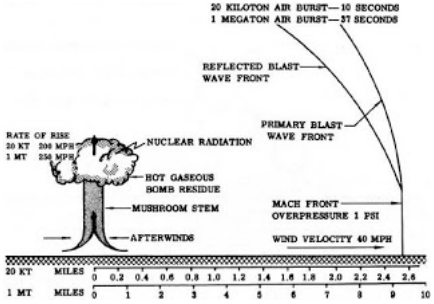
From Dr Glasstone's *Effects of Nuclear Weapons* (1962/64 ed., page 631): 'At distances between 0.3 and 0.4 mile from ground zero in Hiroshima the average survival rate, for at least 20 days after the nuclear explosion, was less than 20 percent. Yet in two reinforced concrete office buildings, at these distances, almost 90 percent of the nearly 800 occupants survived more than 20 days, although some died later of radiation injury. Furthermore, of approximately 3,000 school students who were in the open and unshielded within a mile of ground zero at Hiroshima, about 90 percent were dead or missing after the explosion. But of nearly 5,000 students in the same zone who were shielded in one way or another, only 26 percent were fatalities. ... survival in Hiroshima was possible in buildings at such distances that the overpressure in the open was 15 to 20 pounds per square inch. ... it is evident ... that the area over which protection could be effective in saving lives is roughly eight to ten times as great as that in which the chances of survival are small.'

Lord Mayhew, House of Lords debate on Civil Defence (General Local Authority Functions) Regulations, Hansard, vol. 444, cc. 523-49, 1 November 1983: '... if there had been effective civil defence at Hiroshima probably thousands of lives would have been saved and much human suffering would have been avoided. There is no question about it. ...'

Since the 1977 update by **Glasstone and Dolan, extensive new updates to EM-1 for a further revised edition** of *The Effects of Nuclear Weapons* have not actually been published with unlimited public distribution, due to President Carter's 1979 executive order which transferred responsibility for civil defense from the jurisdiction of the U.S. Department of Defense's Defense Civil Preparedness Agency to the new agency (which is not an Agency of the U.S. Department of Defense, and is not concerned with the analysis of nuclear weapons test effects data), the Federal Emergency Management Agency. However, the **February 1997 U.S. Department of Defense's Defense Special Weapons Agency 0602715H RDT&E Budget Item Justification Sheet (R-2 Exhibit) states that a revision of Glasstone and Dolan's unclassified *Effects of Nuclear Weapons* was budgeted for 1997-9:**

"FY 1997 Plans: ... Provide text to update Glasstone's book, *The Effects of Nuclear Weapons,* the standard reference for nuclear weapons effects. ... Update the unclassified textbook entitled, *The Effects of Nuclear Weapons.* ... Continue revision of Glasstone's book, *The Effects of Nuclear Weapons,* the standard reference for nuclear weapons effects. ... FY1999 Plans ... Disseminate updated *The Effects of Nuclear Weapons.*"

The new publications are either classified or unclassified with limited distribution restrictions (e.g., **Bridgman's *Introduction to the Physics of Nuclear Weapons Effects,* which includes several chapters on nuclear weapons design to enable initial radiation outputs to be calculated precisely**) which prevents up-to-date basic nuclear effects information to justify civil defense against the latest nuclear threats from being widely disseminated; the books are printed for use only by government agencies. The problem with this approach is that widespread public understanding of the best information for civil defense countermeasures is prevented.



'The evidence from Hiroshima indicates that blast survivors, both injured and uninjured, in buildings later consumed by fire [caused by the blast

overturning charcoal braziers used for breakfast in inflammable wooden houses filled with easily ignitable bamboo furnishings and paper screens] were generally able to move to safe areas following the explosion. Of 130 major buildings studied by the U.S. Strategic Bombing Survey ... 107 were ultimately burned out ... Of those suffering fire, about 20 percent were burning after the first half hour. The remainder were consumed by fire spread, some as late as 15 hours after the blast. This situation is not unlike the one our computer-based fire spread model described for Detroit.'

- Defense Civil Preparedness Agency, U.S. Department of Defense, *DCPA Attack Environment Manual, Chapter 3: What the Planner Needs to Know About Fire Ignition and Spread,* report CPG 2-1A3, June 1973, Panel 27.

***The Effects of the Atomic Bomb on Hiroshima, Japan,* US Strategic Bombing Survey, Pacific Theatre, report 92, volume 2 (May 1947, secret):**

Volume one, page 14:

"... the city lacked buildings with fire-protective features such as automatic fire doors and automatic sprinkler systems", and pages 26-28 state the heat flash in Hiroshima was only:

"... capable of starting primary fires in exposed, easily combustible materials such as dark cloth, thin paper, or dry rotted wood exposed to direct radiation at distances usually within 4,000 feet of the point of detonation (AZ)."

Volume two examines the firestorm and the ignition of clothing by the thermal radiation flash in Hiroshima:

Page 24:

"Scores of persons throughout all sections of the city were questioned concerning the ignition of clothing by the flash from the bomb. ... Ten school boys were located during the study who had been in school yards about 6,200 feet east and 7,000 feet west, respectively, from AZ [air zero]. These boys had flash burns on the portions of their faces which had been directly exposed to rays of the bomb. The boys' stories were consistent to the effect that their clothing, apparently of cotton materials, 'smoked,' but did not burst into flame. ... a boy's coat ... started to smoulder from heat rays at 3,800 feet from AZ." [Contrast this to the obfuscation and vagueness in Glasstone, *The Effects of Nuclear Weapons*!]

Page 88:

"Ignition of the City. ... Only directly exposed surfaces were flash burned. Measured from GZ, flash burns on wood poles were observed at 13,000 feet, granite was roughened or spalled by heat at 1,300 feet, and vitreous tiles on roofs were blistered at 4,000 feet. ... six persons who had been in reinforced-concrete buildings within 3,200 feet of air zero stated that black cotton blackout curtains were ignited by radiant heat ... dark clothing was scorched and, in some cases, reported to have burst into flame from flash heat [*although as the 1946 unclassified USSBS report admits, most immediately beat the flames out with their hands without sustaining injury, because the clothing was not drenched in gasoline, unlike peacetime gasoline tanker road accident victims*]

"... but a large proportion of over 1,000 persons questioned was in agreement that a great majority of the original fires was started by debris falling on kitchen charcoal fires, by industrial process fires, or by electric short circuits. Hundreds of fires were reported to have started in the centre of the city within 10 minutes after the explosion. Of the total number of buildings investigated [135 buildings are listed] 107 caught fire, and in 69 instances, the probable cause of initial ignition of the buildings or their contents was as follows: (1) 8 by direct radiated heat from the bomb (primary fire), (2) 8 by secondary sources, and (3) 53 by fire spread from exposed [wooden] buildings."

'It is true that the Soviets have tested nuclear weapons of a yield higher than that which we thought necessary, but the 100-megaton bomb of which they spoke two years ago does not and will not change the balance of strategic power. The United States has chosen, deliberately, to concentrate on more mobile and more efficient weapons, with lower but entirely sufficient yield ...' - President John F. Kennedy in his television broadcast to the American public, 26 July 1963.

'During World War II many large cities in England, Germany, and Japan were subjected to terrific attacks by high-explosive and incendiary bombs.

Yet, when proper steps had been taken for the protection of the civilian population and for the restoration of services after the bombing, there was little, if any, evidence of panic. It is the purpose of this book to state the facts concerning the atomic bomb, and to make an objective, scientific analysis of these facts. It is hoped that as a result, although it may not be feasible completely to allay fear, it will at least be possible to avoid panic.'

– **Dr George Gamow (the big bang cosmologist)**, Dr **Samuel Glasstone**, DSc (Executive Editor of the book), and **Professor Joseph O. Hirschfelder**, ***The Effects of Atomic Weapons,* Chapter 1, p. 1, Paragraph 1.3, U.S. Department of Defense, September 1950.**

'The consequences of a multiweapon nuclear attack would certainly be grave ... Nevertheless, recovery should be possible if plans exist and are carried out to restore social order and to mitigate the economic disruption.'

- **Philip J. Dolan**, editor of *Nuclear Weapons Employment* FM 101-31 (1963), *Capabilities of Nuclear Weapons* DNA-EM-1 (1972), and *The Effects of Nuclear Weapons* (1977), Stanford Research Institute, Appendix A of the **U.S. National Council on Radiological protection (NCRP) symposium *The Control of Exposure to the Public of Ionising Radiation in the Event of Accident or Attack,* 1981.**

'Suppose the bomb dropped on Hiroshima had been 1,000 times as powerful ... It could not have killed 1,000 times as many people, but at most the entire population of Hiroshima ... [regarding the hype about various nuclear "overkill" exaggerations] there is enough water in the oceans to drown everyone ten times.'

- Professor Brian Martin, PhD (physics), 'The global health effects of nuclear war', *Current Affairs Bulletin,* Vol. 59, No. 7, December 1982, pp. 14-26.

In 1996, half a century after the nuclear detonations, data on cancers from the Hiroshima and Nagasaki survivors was published by D. A. Pierce et al. of the Radiation Effects Research Foundation, RERF (*Radiation Research* vol. 146 pp. 1-27; *Science* vol. 272, pp. 632-3) for 86,572 survivors, of whom 60% had received bomb doses of over 5 mSv (or 500 millirem in old units) suffering 4,741 cancers of which only 420 were due to radiation, consisting of 85 leukemias and 335 solid cancers.

'Today we have a population of 2,383 [radium dial painter] cases for whom we have reliable body content measurements. . . . All 64 bone sarcoma [cancer] cases occurred in the 264 cases with more than 10 Gy [1,000 rads], while no sarcomas appeared in the 2,119 radium cases with less than 10 Gy.'

- Dr Robert Rowland, Director of the Center for Human Radiobiology, *Bone Sarcoma in Humans Induced by Radium: A Threshold Response?,* Proceedings of the 27th Annual Meeting, European Society for Radiation Biology, Radioprotection colloquies, Vol. 32CI (1997), pp. 331-8.

Zbigniew Jaworowski, 'Radiation Risk and Ethics: Health Hazards, Prevention Costs, and Radiophobia', *Physics Today,* April 2000, pp. 89-90:

'... it is important to note that, given the effects of a few seconds of irradiation at Hiroshima and Nagasaki in 1945, a threshold near 200 mSv may be expected for leukemia and some solid tumors. [Sources: UNSCEAR, *Sources and Effects of Ionizing Radiation,* New York, 1994; W. F. Heidenreich, et al., *Radiat. Environ. Biophys.,* vol. 36 (1999), p. 205; and B. L. Cohen, *Radiat. Res.,* vol. 149 (1998), p. 525.] For a protracted lifetime natural exposure, a threshold may be set at a level of several thousand millisieverts for malignancies, of 10 grays for radium-226 in bones, and probably about 1.5-2.0 Gy for lung cancer after x-ray and gamma irradiation. [Sources: G. Jaikrishan, et al., *Radiation Research,* vol. 152 (1999), p. S149 (for natural exposure); R. D. Evans, *Health Physics,* vol. 27 (1974), p. 497 (for radium-226); H. H. Rossi and M. Zaider, *Radiat. Environ. Biophys.,* vol. 36 (1997), p. 85 (for radiogenic lung cancer).] The hormetic effects, such as a decreased cancer incidence at low doses and increased longevity, may be used as a guide for estimating practical thresholds and for setting standards. ...

'Though about a hundred of the million daily spontaneous DNA damages per cell remain unrepaired or misrepaired, apoptosis, differentiation, necrosis, cell cycle regulation, intercellular interactions, and the immune system remove about 99% of the altered cells. [Source: R. D. Stewart, *Radiation Research,* vol. 152 (1999), p. 101.] ...

'[Due to the Chernobyl nuclear accident in 1986] as of 1998 (according to UNSCEAR), a total of 1,791 thyroid cancers in children had been registered. About 93% of the youngsters have a prospect of full recovery. [Source: C. R. Moir and R. L. Telander, *Seminars in Pediatric Surgery,*

vol. 3 (1994), p. 182.] ... The highest average thyroid doses in children (177 mGy) were accumulated in the Gomel region of Belarus. The highest incidence of thyroid cancer (17.9 cases per 100,000 children) occurred there in 1995, which means that the rate had increased by a factor of about 25 since 1987.

'This rate increase was probably a result of improved screening [not radiation!]. Even then, the incidence rate for occult thyroid cancers was still a thousand times lower than it was for occult thyroid cancers in nonexposed populations (in the US, for example, the rate is 13,000 per 100,000 persons, and in Finland it is 35,600 per 100,000 persons). Thus, given the prospect of improved diagnostics, there is an enormous potential for detecting yet more [fictitious] "excess" thyroid cancers. In a study in the US that was performed during the period of active screening in 1974-79, it was determined that the incidence rate of malignant and other thyroid nodules was greater by 21-fold than it had been in the pre-1974 period. [Source: Z. Jaworowski, *21st Century Science and Technology,* vol. 11 (1998), issue 1, p. 14.]'

'Professor **Edward Lewis** used data from four independent populations exposed to radiation to demonstrate that the incidence of leukemia was linearly related to the accumulated dose of radiation. ... Outspoken scientists, including Linus Pauling, used **Lewis**'s risk estimate to inform the public about the danger of nuclear fallout by estimating the number of leukemia deaths that would be caused by the test detonations. In May of 1957 **Lewis**'s analysis of the radiation-induced human leukemia data was published as a lead article in Science magazine. In June he presented it before the Joint Committee on Atomic Energy of the US Congress.' – Abstract of thesis by Jennifer Caron, ***Edward Lewis*** *and Radioactive Fallout: the Impact of Caltech Biologists Over Nuclear Weapons Testing in the 1950s and 60s,* Caltech, January 2003.

Dr John F. Loutit of the Medical Research Council, Harwell, England, in 1962 wrote a book called Irradiation of Mice and Men (University of Chicago Press, Chicago and London), discrediting the pseudo-science from geneticist **Edward Lewis** on pages 61, and 78-79:

'... Mole [R. H. Mole, *Brit. J. Radiol.,* v32, p497, 1959] gave different groups of mice an integrated total of 1,000 r of X-rays over a period of 4 weeks. But the dose-rate - and therefore the radiation-free time between fractions - was varied from 81 r/hour intermittently to 1.3 r/hour continuously. The incidence of leukemia varied from 40 per cent (within 15 months of the start of irradiation) in the first group to 5 per cent in the last compared with 2 per cent incidence in irradiated controls. …

'What **Lewis** did, and which I have not copied, was to include in his table another group - spontaneous incidence of leukemia (Brooklyn, N.Y.) - who are taken to have received only natural background radiation throughout life at the very low dose-rate of 0.1-0.2 rad per year: the best estimate is listed as 2×10^{-6} like the others in the table. But the value of 2×10^{-6} was not calculated from the data as for the other groups; it was merely adopted. By its adoption and multiplication with the average age in years of Brooklyners - 33.7 years and radiation dose per year of 0.1-0.2 rad - a mortality rate of 7 to 13 cases per million per year due to background radiation was deduced, or some 10-20 per cent of the observed rate of 65 cases per million per year. ...

'All these points are very much against the basic hypothesis of **Lewis** of a linear relation of dose to leukemic effect irrespective of time. Unhappily it is not possible to claim for **Lewis**'s work as others have done, "It is now possible to calculate - within narrow limits - how many deaths from leukemia will result in any population from an increase in fall-out or other source of radiation" [Leading article in *Science,* vol. 125, p. 963, 1957]. This is just wishful journalese.

'The burning questions to me are not what are the numbers of leukemia to be expected from atom bombs or radiotherapy, but what is to be expected from natural background .... Furthermore, to obtain estimates of these, I believe it is wrong to go to [1950s inaccurate, dose rate effect ignoring, data from] atom bombs, where the radiations are qualitatively different [i.e., including effects from neutrons] and, more important, the dose-rate outstandingly different.'

Samuel Glasstone and Philip J. Dolan, ***The Effects of Nuclear Weapons,*** **3rd ed., 1977, pp. 611-3:**

'From the earlier studies of radiation-induced mutations, made with fruitflies [by Nobel Laureate Hermann J. Muller and other geneticists who worked on plants, who falsely hyped their insect and plant data as valid for mammals like humans during the June 1957 U.S. Congressional Hearings on fallout effects], it appeared that the number (or frequency) of mutations in a given population ... is proportional to the total dose ... More recent experiments with mice, however, have shown that these conclusions need to be revised, at least for mammals. [***Mammals are biologically closer to humans, in respect to DNA repair mechanisms,*** *than short-lived insects whose life cycles are too small to have forced the evolutionary development of advanced DNA repair mechanisms, unlike mammals that need to survive for decades before reproducing.*] When exposed to X-rays or

gamma rays, the mutation frequency in these animals has been found to be dependent on the exposure (or dose) rate ...

'**At an exposure rate of 0.009 roentgen per minute [0.54 R/hour], the total mutation frequency in female mice is indistinguishable from the spontaneous frequency.** [Emphasis added.] **There thus seems to be an exposure-rate threshold below which radiation-induced mutations are absent** ... with adult female mice ... a delay of at least seven weeks between exposure to a substantial dose of radiation, either neutrons or gamma rays, and conception causes the mutation frequency in the offspring to drop almost to zero. ... **recovery** in the female members of the population would bring about a substantial reduction in the 'load' of mutations in subsequent generations.'

George Bernard Shaw cynically explains groupthink brainwashing bias:

'We cannot help it because we are so constituted that we always believe finally what we wish to believe. The moment we want to believe something, we suddenly see all the arguments for it and become blind to the arguments against it. The moment we want to disbelieve anything we have previously believed, we suddenly discover not only that there is a mass of evidence against, but that this evidence was staring us in the face all the time.'

From the essay titled 'What is Science?' by Professor Richard P. Feynman, presented at the fifteenth annual meeting of the National Science Teachers Association, 1966 in New York City, and published in *The Physics Teacher,* vol. 7, issue 6, 1968, pp. 313-20:

'... great religions are dissipated by following form without remembering the direct content of the teaching of the great leaders. In the same way, it is possible to follow form and call it science, but that is pseudo-science. In this way, we all suffer from the kind of tyranny we have today in the many institutions that have come under the influence of pseudoscientific advisers.

'We have many studies in teaching, for example, in which people make observations, make lists, do statistics, and so on, but these do not thereby become established science, established knowledge. They are merely an imitative form of science analogous to the South Sea Islanders' airfields - radio towers, etc., made out of wood. The islanders expect a great airplane to arrive. They even build wooden airplanes of the same shape as they see in the foreigners' airfields around them, but strangely enough, their wood planes do not fly. The result of this pseudoscientific imitation is to produce experts, which many of you are. ... you teachers, who are really teaching children at the bottom of the heap, can maybe doubt the experts. As a matter of fact, I can also define science another way: Science is the belief in the ignorance of experts.'

Richard P. Feynman, 'This Unscientific Age', in *The Meaning of It All,* Penguin Books, London, 1998, pages 106-9:

'Now, I say if a man is absolutely honest and wants to protect the populace from the effects of radioactivity, which is what our scientific friends often say they are trying to do, then he should work on the biggest number, not on the smallest number, and he should try to point out that the [natural cosmic] radioactivity which is absorbed by living in the city of Denver is so much more serious [than the smaller doses from nuclear explosions] ... that all the people of Denver ought to move to lower altitudes.'

Feynman is *not* making a point about low level radiation effects, but about the politics of ignoring the massive natural background radiation dose, while provoking hysteria over much smaller measured fallout pollution radiation doses. Why is the anti-nuclear lobby so concerned about banning nuclear energy - which is not possible even in principle since most of our nuclear radiation is from the sun and from supernova debris contaminating the Earth from the explosion that created the solar system circa 4,540 million years ago - when they could cause much bigger radiation dose reductions to the population by concentrating on the bigger radiation source, natural background radiation. It is possible to shield natural background radiation by the air, e.g. by moving the population of high altitude cities to lower altitudes where there is more air between the people and outer space, or banning the use of high-altitude jet aircraft. The anti-nuclear lobby, as Feynman stated back in the 1960s, didn't crusade to reduce the bigger dose from background radiation. Instead they chose to argue against the *much smaller* doses from fallout pollution. Feynman's argument is still today falsely interpreted as a political statement, when it is actually exposing pseudo-science and countering political propaganda. It is still ignored by the media. It has been pointed out by Senator Hickenlooper on page 1060 of the May-June 1957 U.S. Congressional Hearings before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, *The Nature of Radioactive Fallout and Its Effects on Man:*

'I presume all of us would earnestly hope that we never had to test atomic weapons ... but by the same token I presume that we want to save thousands of lives in this country every year and we could just abolish the manufacture of [road accident causing] automobiles ...'

Dihydrogen monoxide is a potentially very dangerous chemical containing hydrogen and oxygen which has caused numerous severe burns by scalding

and deaths by drowning, contributes to the greenhouse effect, accelerates corrosion and rusting of many metals, and contributes to the erosion of our natural landscape: 'Dihydrogen monoxide (DHMO) is colorless, odorless, tasteless, and kills uncounted thousands of people every year. Most of these deaths are caused by accidental inhalation of DHMO, but the dangers of dihydrogen monoxide do not end there. Prolonged exposure to its solid form causes severe tissue damage. Symptoms of DHMO ingestion can include excessive sweating and urination, and possibly a bloated feeling, nausea, vomiting and body electrolyte imbalance. For those who have become dependent, DHMO withdrawal means certain death.'

From the site for the petition against dihydrogen monoxide: **'Please sign this petition and help stop This Invisible Killer. Get the government to do something now. ... Contamination Is Reaching Epidemic Proportions! Quantities of dihydrogen monoxide have been found in almost every stream, lake, and reservoir in America today. But the pollution is global, and the contaminant has even been found in Antarctic ice. DHMO has caused millions of dollars of property damage in the Midwest, and recently California.'**

A recent example of the pseudoscientific radiation 'education' masquerading as science that Feynman (quoted above) objected to in the 1960s was published in 2009 in an article called 'The proportion of childhood leukaemia incidence in Great Britain that may be caused by natural background ionizing radiation' in *Leukemia,* vol. 23 (2009), pp. 770–776, which falsely asserts - in contradiction to the evidence that the no-threshold model is *contrary* to Hiroshima and Nagasaki data: 'Risk models based primarily on studies of the Japanese atomic bomb survivors imply that low-level exposure to ionizing radiation, including ubiquitous natural background radiation, also raises the risk of childhood leukaemia. Using two sets of recently published leukaemia risk models and estimates of natural background radiation red-bone-marrow doses received by children, about 20% of the cases of childhood leukaemia in Great Britain are predicted to be attributable to this source.' The authors of this pseudoscience which is the opposite of the facts are R. Wakeford (Dalton Nuclear Institute, University of Manchester, Manchester, UK), G. M. Kendall (Childhood Cancer Research Group, Oxford, UK), and M. P. Little (Department of Epidemiology and Public Health, Imperial College, London, UK). It is disgusting and sinful that the facts about childhood leukemia are being lied on so blatantly for non-scientific purposes, and it is to be hoped that these leukemia investigators will either correct their errors or alternatively be banned from using scientific literature to promote false dogma for deception until they mend the error of their ways and repent their sins in this matter.

Protein P53, discovered only in 1979, is encoded by gene TP53, which occurs on human chromosome 17. P53 also occurs in other mammals including mice, rats and dogs. P53 is one of the proteins which continually repairs breaks in DNA, which easily breaks at body temperature: the DNA in each cell of the human body suffers at least two single strand breaks every second, and one double strand (i.e. complete double helix) DNA break occurs at least once every 2 hours (5% of radiation-induced DNA breaks are double strand breaks, while 0.007% of spontaneous DNA breaks at body temperature are double strand breaks)! Cancer occurs when several breaks in DNA happen to occur by chance at nearly the same time, giving several loose strand ends at once, which repair proteins like P53 then repair incorrectly, causing a mutation which can be proliferated somatically. This cannot occur when only one break occurs, because only two loose ends are produced, and P53 will reattach them correctly. But if low-LET ionising radiation levels are increased to a certain extent, causing more single strand breaks, P53 works faster and is able deal with faster breaks as they occur, so that multiple broken strand ends do not arise. This prevents DNA strands being repaired incorrectly, and prevents cancer - a result of mutation caused by faults in DNA - from arising. Too much radiation of course overloads the P53 repair mechanism, and then it cannot repair breaks as they occur, so multiple breaks begin to appear and loose ends of DNA are wrongly connected by P53, causing an increased cancer risk.

1. DNA-damaging free radicals are equivalent to a source of sparks which is always present naturally.

2. Cancer is equivalent the fire you get if the sparks are allowed to ignite the gasoline, i.e. if the free radicals are allowed to damage DNA without the damage being repaired.

3. Protein P53 is equivalent to a fire suppression system which is constantly damping out the sparks, or repairing the damaged DNA so that cancer doesn't occur.

In this way of thinking, the 'cause' of cancer will be down to a failure of a DNA repairing enzyme like protein P53 to repair the damage.

Dr Jane Orient, 'Homeland Security for Physicians', *Journal of American Physicians and Surgeons,* vol. 11, number 3, Fall 2006, pp. 75-9:

'In the 1960s, a group of activist physicians called Physicians for Social Responsibility (PSR) undertook to "educate the medical profession and the

world about the dangers of nuclear weapons," beginning with a series of articles in the *New England Journal of Medicine*. **[Note that journal was publishing information for anti-civil defense propaganda back in 1949, e.g. the article in volume 241, pp. 647-53 of New England Journal of Medicine which falsely suggests that civil defense in nuclear war would be hopeless because a single burned patient in 1947 with 40% body area burns required 42 oxygen tanks, 36 pints of plasma, 40 pints of whole blood, 104 pints of fluids, 4,300 m of gauze, 3 nurses and 2 doctors. First, only unclothed persons in direct line of sight without shadowing can get 40% body area burns from thermal radiation, second, duck and cover offers protection in a nuclear attack warning, and G. V. LeRoy had already published, two years earlier, in J.A.M.A., volume 134, 1947, pp. 1143-8, that less than 5% of burns in Hiroshima and Nagasaki were caused by building and debris fires. In medicine it is always possible to expend vast resources on patients who are fatally injured. In a mass casualty situation, doctors should not give up just because they don't have unlimited resources; as at Hiroshima and Nagasaki, they would need to do their best with what they have.]** On its website, www.psr.org, the group boasts that it "led the campaign to end atmospheric nuclear testing." With this campaign, the linear no-threshold (LNT) theory of radiation carcinogenesis became entrenched. It enabled activists to calculate enormous numbers of potential casualties by taking a tiny risk and multiplying it by the population of the earth. As an enduring consequence, the perceived risks of radiation are far out of proportion to actual risks, causing tremendous damage to the American nuclear industry. ... Efforts to save lives were not only futile, but unethical: Any suggestion that nuclear war could be survivable increased its likelihood and was thus tantamount to warmongering, PSR spokesmen warned. ...

'For the mindset that engendered and enables this situation, which jeopardizes the existence of the United States as a nation as well as the lives of millions of its citizens, some American physicians and certain prestigious medical organizations bear a heavy responsibility.

'Ethical physicians should stand ready to help patients to the best of their ability, and not advocate sacrificing them in the name of a political agenda. **Even very basic knowledge, especially combined with simple, inexpensive advance preparations, could save countless lives**.'

Dr Theodore B. Taylor, *Proceedings of the Second Interdisciplinary Conference on Selected Effects of a General War,* DASIAC Special Report 95, July 1969, vol. 2, DASA-2019-2, AD0696959, page 298 (also **linked here**):

'I must just say that as far as I'm concerned I have had some doubts about whether we should have had a civil defense program in the past. I have no doubt whatsoever now, for this reason, that I've seen **ways in which the deterrent forces can fail to hold things off, so that no matter what our national leaders do, criminal organizations, what have you, groups of people over which we have no control whatsoever, can threaten other groups of people.'**

This point of Taylor is the key fact on the morality. Suppose we disarm and abandon nuclear power. That won't stop fallout from a war, terrorists, or a foreign reactor blast from coming. Civil defence knowledge is needed. Even when America has ABM, it will be vulnerable to wind carried fallout. No quantity of pacifist hot air will protect people against radiation.

Charles J. Hitch and Roland B. McKean of the RAND Corporation in their 1960 book *The Economics of Defense in the Nuclear Age,* Harvard University Press, Massachusetts, pp. 310-57:

'With each side possessing only a small striking force, a small amount of cheating would give one side dominance over the other, and the incentive to cheat and prepare a preventative attack would be strong ... With each side possessing, say, several thousand missiles, a vast amount of cheating would be necessary to give one side the ability to wipe out the other's striking capability. ... the more extensive a disarmament agreement is, the smaller the force that a violator would have to hide in order to achieve complete domination. Most obviously, "the abolition of the weapons necessary in a general or 'unlimited' war" would offer the most insuperable obstacles to an inspection plan, since the violator could gain an overwhelming advantage from the concealment of even a few weapons.'

Disarmament after World War I caused the following problem which led to World War II (reported by Winston S. Churchill in the London Daily Express newspaper of November 1, 1934):

'Germany is arming secretly, illegally and rapidly. A reign of terror exists in Germany to keep secret the feverish and terrible preparations they are making.'

British Prime Minister Thatcher's address to the United Nations General Assembly on disarmament on 23 June 1982, where she pointed out that in

the years since the nuclear attacks on Hiroshima and Nagasaki, 10 million people had been killed by 140 non-nuclear conflicts:

'The fundamental risk to peace is not the existence of weapons of particular types. It is the disposition on the part of some states to impose change on others by resorting to force against other nations ... Aggressors do not start wars because an adversary has built up his own strength. They start wars because they believe they can gain more by going to war than by remaining at peace.'

J. D. Culshaw, the then Director of the U.K. Home Office Scientific Advisory Branch, stated in his article in the Scientific Advisory Branch journal *Fission Fragments,* September 1972 (issue No. 19), classified 'Restricted':

'Apart from those who don't want to know or can't be bothered, there seem to be three major schools of thought about the nature of a possible Third World War ...

* 'The first group think of something like World War II but a little worse ...

* '... the second of World War II but very much worse ...

* 'and the third group think in terms of a catastrophe ...

'When the Armageddon concept is in favour, the suggestion that such problems exist leads to "way out" research on these phenomena, and it is sufficient to mention a new catastrophic threat [e.g., 10 years later this was done by Sagan with "nuclear winter" hype, which turned out to be fake because modern concrete cities can't produce firestorms like 1940s wooden-built areas of Hamburg, Dresden and Hiroshima] to stimulate research into the possibilities of it arising. The underlying appeal of this concept is that if one could show that the execution of all out nuclear, biological or chemical warfare would precipitate the end of the world, no one but a mad man would be prepared to initiate such a war. [However, as history proves, plenty of mad men end up gaining power and leading countries into wars.]'

J. K. S. Clayton, then Director of the U.K. Home Office Scientific Advisory Branch, stated in his introduction, entitled *The Challenge - Why Home Defence?,* to the 1977 Home Office Scientific Advisory Branch *Training Manual for Scientific Advisers:*

'Since 1945 we have had nine wars - in Korea, Malaysia and Vietnam, between China and India, China and Russia, India and Pakistan and between the Arabs and Israelis on three occasions. We have had confrontations between East and West over Berlin, Formosa and Cuba. There have been civil wars or rebellions in no less than eleven countries and invasions or threatened invasions of another five. Whilst it is not suggested that all these incidents could have resulted in major wars, they do indicate the aptitude of mankind to resort to a forceful solution of its problems, sometimes with success. ...'

It is estimated that Mongol invaders exterminated 35 million Chinese between 1311-40, without modern weapons. Communist Chinese killed 26.3 million dissenters between 1949 and May 1965, according to detailed data compiled by the Russians on 7 April 1969. The Soviet communist dictatorship killed 40 million dissenters, mainly owners of small farms, between 1917-59. Conventional (non-nuclear) air raids on Japan killed 600,000 during World War II. The single incendiary air raid on Tokyo on 10 March 1945 killed 140,000 people (more than the total for nuclear bombs on Hiroshima and Nagasaki combined) at much less than the $2 billion expense of the Hiroshima and Nagasaki nuclear bombs! Non-nuclear air raids on Germany during World War II killed 593,000 civilians.

House of Lords debate *Nuclear Weapons: Destructive Power,* published in Hansard, 14 June 1988:

Lord Hailsham of Saint Marylebone: 'My Lords, if we are going into the question of lethality of weapons and seek thereby to isolate the nuclear as distinct from the so-called conventional range, is there not a danger that the public may think that Vimy, Passchendaele and Dresden were all right—sort of tea parties—and that nuclear war is something which in itself is unacceptable?'

Lord Trefgarne: 'My Lords, the policy of making Europe, or the rest of the world, safe for conventional war is not one that I support.'

House of Commons debate *Civil Defence* published in Hansard, 26 October 1983:

Mr. Bill Walker (Tayside, North): 'I remind the House that more people died at Stalingrad than at Hiroshima or Nagasaki. Yet people talk about fighting a conventional war in Europe as if it were acceptable. One rarely sees demonstrations by the so-called peace

movement against a conventional war in Europe, but it could be nothing but ghastly and horrendous. The casualties would certainly exceed those at Stalingrad, and that cannot be acceptable to anyone who wants peace'

On 29 October 1982, Thatcher stated of the Berlin Wall: 'In every decade since the war the Soviet leaders have been reminded that their pitiless ideology only survives because it is maintained by force. But the day comes when the anger and frustration of the people is so great that force cannot contain it. Then the edifice cracks: the mortar crumbles ... one day, liberty will dawn on the other side of the wall.'

On 22 November 1990, she said: 'Today, we have a Europe ... where the threat to our security from the overwhelming conventional forces of the Warsaw Pact has been removed; where the Berlin Wall has been torn down and the Cold War is at an end. These immense changes did not come about by chance. They have been achieved by strength and resolution in defence, and by a refusal ever to be intimidated.'

'The case for civil defence stands regardless of whether a nuclear deterrent is necessary or not. ... Even if the U.K. were not itself at war, we would be as powerless to prevent fallout from a nuclear explosion crossing the sea as was King Canute to stop the tide.' - U.K. Home Office leaflet, Civil Defence, 1982.

'... peace cannot be guaranteed absolutely. Nobody can be certain, no matter what policies this or any other Government were to adopt, that the United Kingdom would never again be attacked. Also we cannot tell what form such an attack might take. Current strategic thinking suggests that if war were to break out it would start with a period of conventional hostilities of uncertain duration which might or might not escalate to nuclear conflict. ... while nuclear weapons exist there must always be a chance, however small, that they will be used against us [like gas bombs in World War II]. ... as a consequence of war between other nations in which we were not involved fall out from nuclear explosions could fall on a neutral Britain. ... conventional war is not the soft option that is sometimes suggested. It is also too easily forgotten that in World War II some 50 million people died and that conventional weapons have gone on killing people ever since 1945 without respite.' - **- The Minister of State, Scottish Office (Lord Gray of Contin), House of Lords debate on Civil Defence (General Local Authority Functions) Regulations, Hansard, vol. 444, cc. 523-49, 1 November 1983.**

'All of us are living in the light and warmth of a huge hydrogen bomb, 860,000 miles across and 93 million miles away, which is in a state of continuous explosion.' - Dr Isaac Asimov.

'Dr Edward Teller remarked recently that the origin of the earth was somewhat like the explosion of the atomic bomb...' – Dr Harold C. Urey, *The Planets: Their Origin and Development,* Yale University Press, New Haven, 1952, p. ix.

'But compared with a supernova a hydrogen bomb is the merest trifle. For a supernova is equal in violence to about a million million million million hydrogen bombs all going off at the same time.' – Sir Fred Hoyle (1915-2001), *The Nature of the Universe,* Pelican Books, London, 1963, p. 75.

'In fact, physicists find plenty of interesting and novel physics in the environment of a nuclear explosion. Some of the physical phenomena are valuable objects of research, and promise to provide further understanding of nature.' – Dr Harold L. Brode, The RAND Corporation, 'Review of Nuclear Weapons Effects,' *Annual Review of Nuclear Science,* Volume 18, 1968, pp. 153-202.

'It seems that similarities do exist between the processes of formation of single particles from nuclear explosions and formation of the solar system from the debris of a [4 x 10^{28} megatons of TNT equivalent, type Ia] supernova explosion. We may be able to learn much more about the origin of the earth, by further investigating the process of radioactive fallout from the nuclear weapons tests.' – **Dr Paul K. Kuroda (1917-2001)**, University of Arkansas, 'Radioactive Fallout in Astronomical Settings: Plutonium-244 in the Early Environment of the Solar System,' pages 83-96 of ***Radionuclides in the Environment: A Symposium Sponsored By the Division of Nuclear Chemistry and Technology At the 155th Meeting of the American Chemical Society, San Francisco, California, April 1-3, 1968*****,** edited by Symposium Chairman Dr Edward C. Freiling (1922-2000) of the U.S. Naval Radiological Defense Laboratory, Advances in Chemistry Series No. 93, American Chemical Society, Washington, D.C., 1970.

Dr Paul K. Kuroda (1917-2001) in 1956 correctly predicted the existence of water-moderated natural nuclear reactors in flooded uranium ore seams, which were discovered in 1972 by French physicist Francis Perrin in three ore deposits at Oklo in Gabon, where sixteen sites operated as natural nuclear reactors with self-sustaining nuclear fission 2,000 million years ago, each lasting several hundred thousand years, averaging 100 kW. The radioactive waste they generated remained in situ for a period of 2,000,000,000 years without escaping. They were discovered during

investigations into why the U-235 content of the uranium in the ore was only 0.7171% instead of the normal 0.7202%. Some of the ore, in the middle of the natural reactors, had a U-235 isotopic abundance of just 0.440%. Kuroda's brilliant paper is entitled, 'On the Nuclear Physical Stability of the Uranium Minerals', published in the *Journal of Chemical Physics*, vol. 25 (1956), pp. 781–782 and 1295–1296.

A type Ia supernova explosion, always yielding 4 x 10^{28} megatons of TNT equivalent, results from the critical mass effect of the collapse of a white dwarf as soon as its mass exceeds 1.4 solar masses due to matter falling in from a companion star. The degenerate electron gas in the white dwarf is then no longer able to support the pressure from the weight of gas, which collapses, thereby releasing enough gravitational potential energy as heat and pressure to cause the fusion of carbon and oxygen into heavy elements, creating massive amounts of radioactive nuclides, particularly intensely radioactive nickel-56, but half of all other nuclides (including uranium and heavier) are also produced by the **'R' (rapid) process of successive neutron captures by fusion products in supernovae explosions**. Type Ia supernovae occur typically every 400 years in the Milky Way galaxy. On 4 July 1054, Chinese astronomers observed in the sky (without optical instruments) the bright supernova in the constellation Taurus which today is still visible as the Crab Nebula through telescopes. The Crab Nebula debris has a diameter now of 7 light years and is still expanding at 800 miles/second. The supernova debris shock wave triggers star formation when it encounters hydrogen gas in space by compressing it and seeding it with debris; bright stars are observed in the Orion Halo, the 300 light year diameter remains of a supernova. It is estimated that when the solar system was forming 4,540 million years ago, a supernova occurred around 100 light years away, and the heavy radioactive debris shock wave expanded at 1,000 miles/second. Most of the heavy elements including iron, silicon and calcium in the Earth and people are the stable end products of originally radioactive decay chains from the space burst fallout of a 7 x 10^{26} megatons thermonuclear explosion, created by fusion and successive neutron captures after the implosion of a white dwarf; a supernova explosion.

How would a 10^{55} megaton hydrogen bomb explosion differ from the **big bang**? Ignorant answers biased in favour of curved spacetime (ignoring quantum gravity!) abound, such as claims that explosions can't take place in 'outer space' (disagreeing with the facts from nuclear space bursts by Russia and America in 1962, not to mention natural supernova explosions in space!) and that explosions produce sound waves in air by definition! There are indeed major differences in the nuclear reactions between the big bang and a nuclear bomb. But it is helpful to notice the solid physical fact that implosion systems suggest the mechanism of gravitation: in implosion, TNT is well-known to produce an *inward* force on a bomb core, but Newton's 3rd law says there is an equal and opposite reaction force *outward*. In fact, you can't have a radially outward force without an inward reaction force! It's the rocket principle. The rocket accelerates (with force $F = ma$) *forward* by virtue of the recoil from accelerating the exhaust gas (with force $F = -ma$) in the *opposite* direction! Nothing massive accelerates without an equal and opposite reaction force. Applying this *fact* to the **measured 6 x 10^{-10} ms^{-2} ~ Hc cosmological acceleration of matter radially outward** from observers in the universe which **was predicted accurately in 1996** and later observationally discovered in 1999 (by Perlmutter, et al.), we find an outward force $F = ma$ and inward reaction force by the 3rd law. **The inward force allows quantitative predictions, and is mediated by gravitons, predicting gravitation in a checkable way (unlike string theory, which is just a landscape of 10^{500} different perturbative theories and so can't make any falsifiable predictions about gravity).** So it seems as if nuclear explosions do indeed provide helpful analogies to natural features of the world, and the mainstream lambda-CDM model of cosmology - with its force-fitted unobserved *ad hoc* speculative 'dark energy' - ignores and sweeps under the rug major quantum gravity effects which increase the physical understanding of particle physics, particularly force unification and the relation of gravitation to the existing electroweak SU(2) x U(1) section of the Standard Model of fundamental forces.

Richard Lieu, Physics Department, University of Alabama, 'Lambda-CDM cosmology: how much suppression of credible evidence, and does the model really lead its competitors, using all evidence?', http://arxiv.org/abs/0705.2462.

Even Einstein grasped the possibility that general relativity's lambda-CDM model is at best just a classical approximation to quantum field theory, at the end of his life when he wrote to Besso in 1954:

'I consider it quite possible that physics cannot be based on the [classical differential equation] field principle, i.e., on continuous structures. In that case, nothing remains of my entire castle in the air, [non-quantum] gravitation theory included ...'

'Science is the organized skepticism in the reliability of expert opinion.' - Professor Richard P. Feynman (quoted by Professor Lee Smolin, ***The Trouble with Physics,*** Houghton-Mifflin, New York, 2006, p. 307).

'The expression of dissenting views may not seem like much of a threat to a powerful organization, yet sometimes it triggers an amazingly hostile

response. The reason is that a single dissenter can puncture an illusion of unanimity. ... Among those suppressed have been the engineers who tried to point out problems with the Challenger space shuttle that caused it to blow up. More fundamentally, suppression is a denial of the open dialogue and debate that are the foundation of a free society. Even worse than the silencing of dissidents is the chilling effect such practices have on others. For every individual who speaks out, numerous others decide to play it safe and keep quiet. More serious than external censorship is the problem of self-censorship.'

— Professor Brian Martin, University of Wollongong, 'Stamping Out Dissent', Newsweek, 26 April 1993, pp. 49-50

In 1896, Sir James Mackenzie-Davidson asked Wilhelm Röntgen, who discovered X-rays in 1895: 'What did you think?' Röntgen replied: 'I did not think, I investigated.' The reason? Cathode ray expert J. J. Thomson in 1894 saw glass fluorescence far from a tube, but due to prejudice (expert opinion) he avoided investigating that X-ray evidence! 'Science is the organized skepticism in the reliability of expert opinion.' - Richard Feynman, in Lee Smolin, *The Trouble with Physics,* Houghton-Mifflin, 2006, p. 307.

Mathematical symbols in this blog: your computer's browser needs access to standard character symbol sets to display Greek symbols for mathematical physics. If you don't have the symbol character sets installed, the density symbol 'ρ' (*Rho*) will appear as 'r' and the 'π' (*Pi*) symbol will as 'p', causing confusion with the use of 'r' for radius and 'p' for momentum in formulae. This problem exists with Mozilla Firefox 3, but not with Microsoft Explorer which displays Greek symbols.

About Me

Name: nige

http://nige.wordpress.com/ http://quantumfieldtheory.org/ http://www.math.columbia.edu/~woit/wordpress/?p=273#comment-5322. http://www.math.columbia.edu/~woit/wordpress/?p=353&cpage=1#comment-8728. http://www.math.columbia.edu/~woit/wordpress/?p=215#comment-4082.

View my complete profile

From 1945-62, America tested 216 nuclear weapons in the atmosphere, totalling 154 megatons, with a mean yield of 713 kilotons

From 1949-62, Russia tested 214 nuclear weapons in the atmosphere, totalling 281 megatons, with a mean yield of 1.31 megatons

From 1952-8, Britain tested 21 nuclear weapons in the atmosphere, totalling 10.8 megatons, with a mean yield of 514 kilotons

From 1960-74, France tested 46 nuclear weapons in the atmosphere, totalling 11.4 megatons, with a mean yield of 248 kilotons

From 1964-80, China tested 23 nuclear weapons in the atmosphere, totalling 21.5 megatons, with a mean yield of 935 kilotons

In summary, from 1945-80, America, Russia, Britain, France and China tested 520 nuclear weapons in the atmosphere, totalling 478.7 megatons, with a mean yield of 921 kilotons

Mean yield of the 5,192 nuclear warheads and bombs in the deployed Russian nuclear stockpile as of January 2009: 0.317 Mt. Total yield: 1,646 Mt.

Mean yield of the 4,552 nuclear warheads and bombs in the deployed U.S. nuclear stockpile as of January 2007: 0.257 Mt. Total yield: 1,172 Mt.

For diffraction damage where damage areas scale as the two-thirds power of explosive yield, this stockpile's area damage potential can be compared to the 20,000,000 conventional bombs of 100 kg size (2 megatons of TNT equivalent total *energy*) dropped on Germany during World War II: (Total nuclear bomb blast diffraction damaged ground *area*)/(Total conventional blast diffraction damaged ground *area* to Germany during World War II) = $[4{,}552*(0.257\ \text{Mt})^{2/3}]/[20{,}000{,}000*(0.0000001\ \text{Mt})^{2/3}] = 1{,}840/431 = 4.3$. Thus, although the entire U.S. stockpile has a TNT *energy* equivalent to 586 times that of the 2 megatons of conventional bombs dropped on Germany in World War II, it is only capable of causing 4.3 times as much diffraction type damage area, because *any given amount of explosive energy is far more efficient when distributed over many small explosions than in a single large explosion! Large explosions are inefficient because they cause unintended collateral damage, wasting energy off the target area and injuring or damaging unintended targets!*

In a controlled sample of 36,500 survivors, 89 people got leukemia over a 40 year period, above the number in the unexposed control group. (Data: *Radiation Research,* volume 146, 1996, pages 1-27.) Over 40 years, in 36,500 survivors monitored, there were 176 leukemia deaths which is 89 more than the control (unexposed) group got naturally. There were 4,687 other cancer deaths, but that was merely 339 above the number in the control (unexposed) group, so this is statistically a much smaller rise than the leukemia result. Natural leukemia rates, which are very low in any case, were increased by 51% in the irradiated survivors, but other cancers were merely increased by just 7%. Adding all the cancers together, the total was 4,863 cancers (virtually all natural cancer, nothing whatsoever to do with radiation), which is just 428 more than the unexposed control group. Hence, the total increase over the natural cancer rate due to bomb exposure was only 9%, spread over a period of 40 years. There was no increase whatsoever in genetic malformations.

There should be a note here about how unnatural radioactive pollution is (not) in space: the earth's atmosphere is a radiation shield equivalent to being protected behind a layer of water 10 metres thick. This reduces the cosmic background radiation by a factor of 100 of what it would be without the earth's atmosphere. Away from the largely uninhabited poles, the Earth's magnetic field also protects us against charged cosmic radiations, which are deflected and end up spiralling around the magnetic field at high altitude, in the Van Allen trapped radiation belts. *On the Moon, for example, there is no atmosphere or significant magnetic field so the natural background radiation exposure rate at solar minimum is 1 milliRoentgen per hour (about 10 microSieverts/hour) some 100 times that on the Earth (0.010 milliRoentgen per hour or about 0.10 microSieverts/hour). The Apollo astronauts visiting the Moon wore dosimeters and they received an average of 275 milliRoentgens (about 2.75 milliSieverts) of radiation (well over a year's exposure to natural background at sea level) in over just 19.5 days.* It is a lot more than that during a solar flare, which is one of the concerns for astronauts to avoid (micrometeorites are another concern in a soft spacesuit).

The higher up you are above sea level, the less of the atmosphere there is between you and space, so the less shielding you have to protect you from the intense cosmic space radiations (emitted by thermonuclear reactors we call 'stars', as well as distant supernovae explosions). At sea level, the air above you constitutes a radiation shield of 10 tons per square metre or the equivalent of having a 10 metres thick water shield between you and outer space. As you go up a mountain or up in an aircraft, the amount of atmosphere between you and space decreases, thus radiation levels increase with altitude because there is less shielding. *The normal background radiation exposure rate shoots up by a factor of 20, from 0.010 to 0.20 milliRoentgens per hour, when any airplane ascends from sea level to 36,000 feet cruising altitude.* (The now obsolete British Concorde supersonic transport used to maintain radiation-monitoring equipment so that it could drop to lower-altitude flight routes if excessive cosmic radiation due to solar storms were detected.) Flight aircrew get more radiation exposure than many nuclear industry workers at nuclear power plants. Residents of the high altitude city of Denver get 100 milliRoentgens (about 1 milliSievert) more annual exposure than a resident of Washington, D.C., but the mainstream anti-radiation cranks don't campaign for the city to be shut to save kids radiation exposure, for mountain climbing to be banned, etc.!

1994 revised Introduction to Kearny's Nuclear War Survival Skills, by Dr Edward Teller, January 14, 1994:

'If defense is neglected these weapons of attack become effective. They become available and desirable in the eyes of an imperialist dictator, even if his means are limited. Weapons of mass destruction could become equalizers between nations big and small, highly developed and primitive, if defense is neglected. If defense is developed and if it is made available for general prevention of war, weapons of aggression will become less desirable. Thus defense makes war itself less probable. ... One psychological defense mechanism against danger is to forget about it. This attitude is as common as it is disastrous. It may turn a limited danger into a fatal difficulty.'

Advice of Robert Watson-Watt (Chief Scientist on the World War II British Radar Project, defending Britain against enemy attacks): 'Give them the third best to go on with, the second best comes too late, the best never comes.'

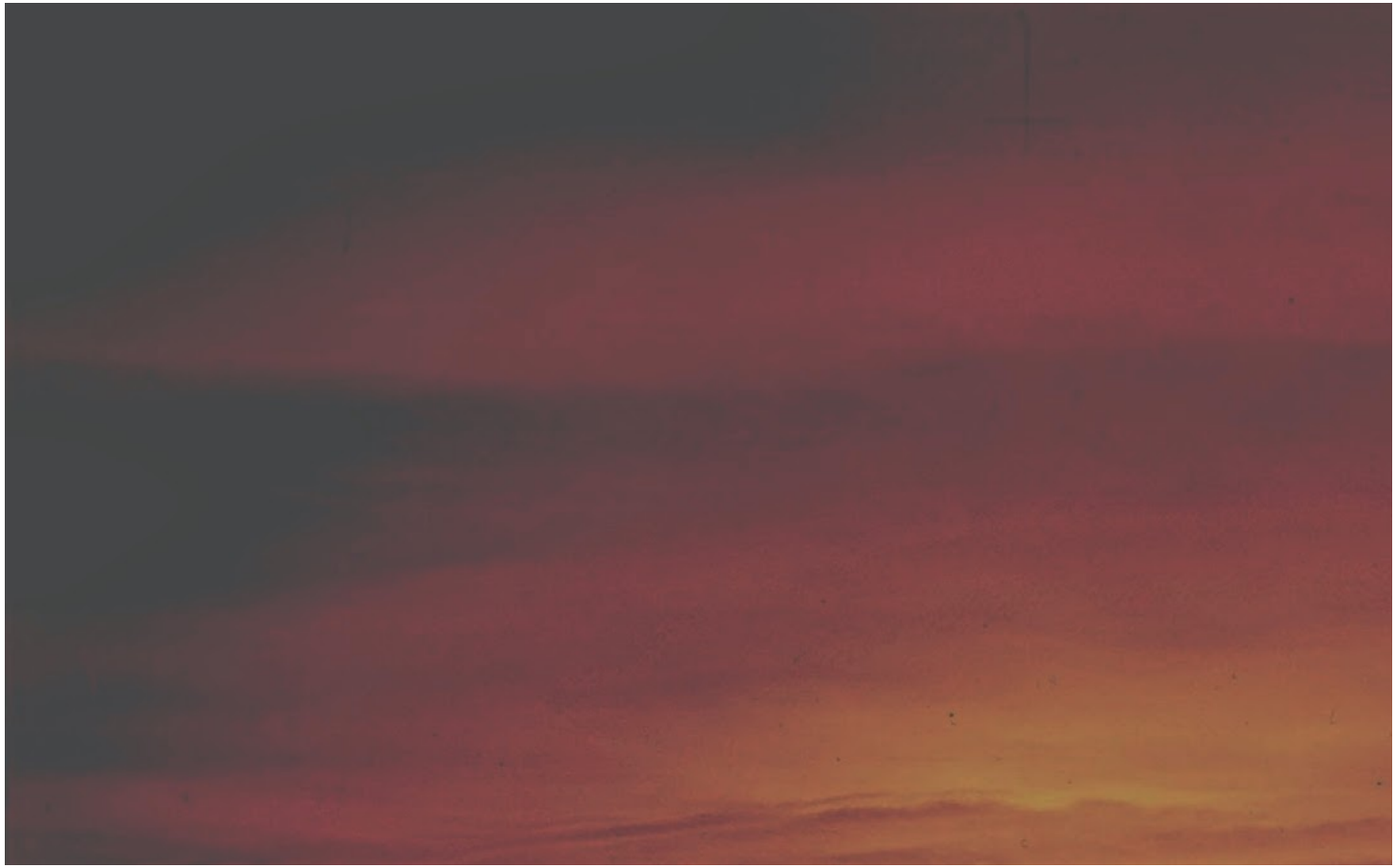
From Wikipedia (a source of groupthink): 'Groupthink is a type of thought exhibited by group members who try to minimize conflict and reach consensus without critically testing, analyzing, and evaluating ideas. Individual creativity, uniqueness, and independent thinking are lost in the pursuit of group cohesiveness, as are the advantages of reasonable balance in choice and thought that might normally be obtained by making decisions as a group. During groupthink, members of the group avoid promoting viewpoints outside the comfort zone of consensus thinking. A variety of motives for this may exist such as a desire to avoid being seen as foolish, or a desire to avoid embarrassing or angering other members of the group. Groupthink may cause groups to make hasty, irrational decisions, where individual doubts are set aside, for fear of upsetting the group's balance.'

Links

- **Google News**
- **Dr Carl E. Baum's EMP theory and interaction notes**
- **The Atomic Heritage Foundation**
- **Radiation Effects Research Foundation lumps data together to cover up benefits of low dose radiation in Hiroshima and Nagasaki Life Span Study!**
- **DTRA (Defense Threat Reduction Agency) Nuclear testing histories (PDF files)**
- **Samuel Glasstone and Philip J. Dolan**
- **Carl F. Miller's fallout research at nuclear tests**
- **British Home Office Scientific Advisory Branch**
- **Samuel Cohen's book about the collateral damage averting, invasion-deterring neutron bomb he invented, and the lying political attacks he endured as a result**
- **Jerry Emanuelson's review of EMP facts, including the direct dependence of the EMP on the Earth's natural magnetic field strength at the burst location**
- **Essays by 1950s American nuclear weapon effects test (and neutron bomb design) experts, discrediting anti-civil defence propaganda**
- **Neutron bomb inventor Samuel Cohen's 2006 book on the history of the neutron bomb, the most moral weapon ever invented due to its purely military deterrent capabilities, and the pesudo-scientific propaganda war he has had to endure from the enemies of deterrence**
- **Karl-Ludvig Grønhaug's EMP reports page with useful PDF downloads on prompt EMP and MHD-EMP measurements from nuclear tests (Norwegian language)**
- **Colonel Derek L. Duke's factual book on nuclear weapons accidents, *Chasing Loose Nukes, as told to Fred Dungan***
- **The H-Bomb and the birth of the Universe: 'For 100 Million years after time began, the universe was dark as pitch. The clouds of hydrogen condensed into huge nuclear fireballs. That moment-when the universe first lit up-was the moment of creation that matters...'**
- **American *EMP Interaction* manual: comprehensive theory of both the EMP source mechanism and the EMP pick-up in cables and antenna by electromagnetic inductance (30 MB PDF file)**
- **British Mission to Japan, *The Effects of the Atomic Bombs at Hiroshima and Nagasaki*, H. M. Stationery Office, London, 1946 (high quality 42.5 MB pdf file).**
- **1950 edition (high quality 82.7 MB PDF file) of U.S. Department of Defense book *The Effects of Atomic Weapons***
- **1957 edition (high quality 90.8 MB PDF file) of subsequently deleted sections on nuclear tests of civil defense countermeasures from U.S. Department of Defense book *The Effects of Nuclear Weapons***
- **1957 edition (low quality 30.6 MB PDF file) of entire U.S. Department of Defense book *The Effects of Nuclear Weapons***
- **1962/64 edition (high quality 188 MB PDF file) of major revised sections in the U.S. Department of Defense book *The Effects of Nuclear Weapons***
- **1962/64 edition (high quality 43.8 MB PDF file) of 74 pages of subsequently deleted material dealing with thermal ignition of houses at nuclear tests and civil defense countermeasures chapter, from the U.S. Department of Defense book *The Effects of Nuclear Weapons***
- **1977 edition (single 36.8 MB PDF file) of U.S. Department of Defense book *The Effects of Nuclear Weapons***
- **Bill Forstchen, "One Second After" book about EMP attack risk and its effects on USA.**
- **U.S. Department of Energy Opennet Documents Online (includes many Nevada and Pacific nuclear test reports as PDF files)**
- **Defense Technical Information Center (DTIC)'s Scientific and Technical Information Network (STINET) Service (other declassified Nevada and Pacific test reports)**
- **Highlights from ABM testing history**

- **THAAD Goes Another ABM Test**
- **Alex Wellerstein's Restricted Data blog contains some interesting news (but beware of his uncritical use of unobstructed dry desert and nude skin thermal radiation and other effects predictions from the 1977 edition of Glasstone and Dolan; he deletes critically objective comments and pretends that honest criticisms of propaganda as being ignorant deception are rude as an excuse for ignoring the facts and refusing to engage in objective discussion of controversial aspects of this topic; basically if you pay homage and engage in groupthink bias you may be tolerated).**
- **Carey Sublette's Nuclear Weapon Archive (it contains errors from Chuck Hansen's compilation, and it is concentrated on bomb building, not on civil defence countermeasure evaluations done at nuclear tests; note that Chuck Hansen's books and CDs give a false quotation from Neil O' Hines's book *Proving Ground*son the effects of the 1952 Mike explosion on nearby Engebi Island, where Hines later in the book states that the native rats in fact *survived the intense close-in blast, heat and fallout under a few unches of soil, despite the initial ignorant belief that they could not have survived!!!*)**

- **Quantum Field Theory**
- **Los Alamos Science journal**
- **Excellent particle physics gauge theory (fundamental force interaction) issue of Los Alamos Science journal**
-

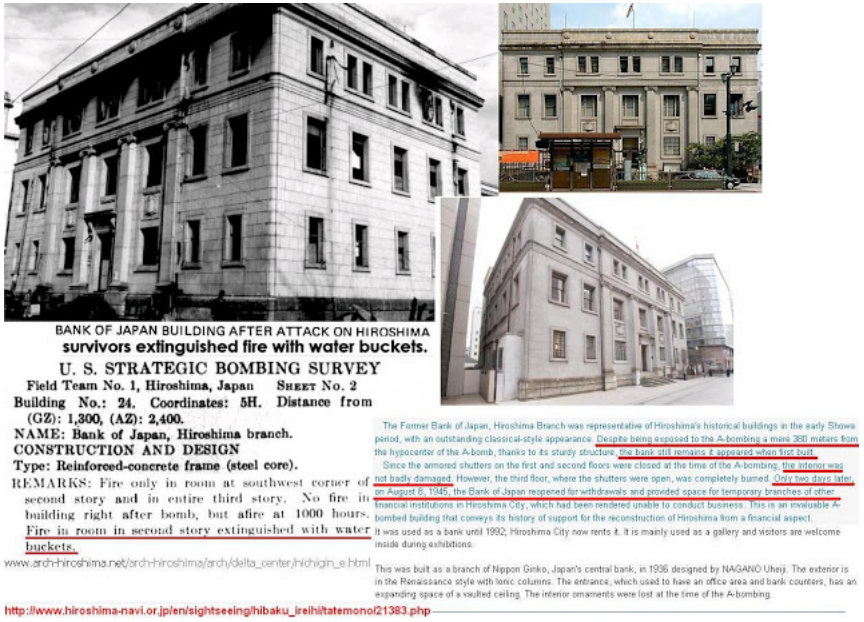


Chemical and Biological Warfare Protective Measures

SHOW ME MORE LIKE CHEMICAL AND BIOLOGICAL WARFARE PROTECTIVE MEASURES
SIMILAR TO CHEMICAL AND BIOLOGICAL WARFARE PROTECTIVE MEASURES
BACK TO DOC
More from ReaderScribt
Previous | Next
Hiroshima Survival Rates in Different Buildings
ReaderScribt
Fallout Patterns in Hiroshima and Nagasaki
ReaderScribt
DCPA Attack Environment Manual
ReaderScribt
Summary of new information on Hiroshima and Nagasaki nuclear attack radiation effects, and the effectiveness of countermeasures
ReaderScribt
Truth About the Cold War: Key Document Extracts
ReaderScribt
Swiss Makeshift Shelters 1977 Handbook Extract
ReaderScribt
Electromagnetic pulse field strengths from surface bursts
ReaderScribt
WT 1218 Nuclear Tests on Shelters Nevada
ReaderScribt
WT 1161 Nuclear Shelter Tests Nevada, 1955

- **800 war migrants drowned on 22 April by EU policy:...**
- **Photographed fireball shielding by cloud cover in ...**
- **Nuclear weapons effects "firestorm" and "nuclear w...**
- **Proved 97.5% survival in completely demolished hou...**
- **Is a new Islamic State in the Middle East a real w...**
- **Debunking the hardened dogma of exaggerated nuclea...**
- **CND "pacifists" and their support for terrorist "l...**
- **European Union dictatorship is behind the Ukraine ...**
- **Britain's 1950 studies of nuclear 9/11 and the dis...**

- **Can Britain and America prevail over an alliance o...**



The Bank of Japan, Hiroshima, survived 380 m from Ground Zero, within the firestorm area, when fires were extinguished by water buckets by its survivors, the majority of people in the building having survived. Secret US Strategic Bombing Survey report proves civil defense for modern concrete buildings is effective. The building was reopened as a bank on 8 August, merely two days after nuclear attack, and continued in use as a bank until 1992. It remains in Hiroshima. This beautifully designed and sturdy reinforced concrete building was designed in 1936 by Nagano Uheiji.